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AN EVALUATIVE STUDY OF TEACHER CONSTRUCTED TEST ITEMS FOR BSCS BIOLOGY. FINAL REPORT.

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THIS STUDY PROVIDES A PORTFOLIO OF SEVERAL THOUSAND FIELD-TESTED MULTIPLE CHOICE TEST ITEMS COORDINATED WITH THE CHAPTERS OF THE BIOLOGICAL SCIENCES CURRICULUM STUDY (BSCS) YELLOW VERSION TEXTBOOK. THE ITEMS WERE DEVELOPED BY A TEAM OF HIGH SCHOOL BIOLOGY TEACHERS AND WERE EVALUATED UNDER CLASSROOM CONDITIONS WITH GRADE 10 STUDENTS. A POINT-BISERIAL COMPUTER-BASED PROGRAM WAS DEVELOPED AND USED TO PROVIDE EVALUATION INFORMATION ON THE TEST ITEMS. IDENTIFIED FOR EACH ITEM ARE (1) BSCS THEME WITH WHICH IT DEALS, (2) THE ABILITY CATEGORY WHICH IT IS MEASURING, (3) THE LEVEL OF DIFFICULTY, (4) ITS DISCRIMINATION BASED ON AN INTERNAL CRITERION--TOTAL TEST SCORES, AND (5) ITS DISCRIMINATION BASED ON AN EXTERNAL CRITERION--THE VERBAL REASONING SECTION OF THE DIFFERENTIAL APTITUDE TEST. THE PROTOCOL DESCRIBED FOR DEVELOPING TEST ITEMS, FOR FIELD TESTING THESE ITEMS, AND FOR EVALUATING THEM COULD BE ADAPTED BY OTHER TEACHING GROUPS IN DEVELOPING TEST ITEMS APPROPRIATE TO THEIR OWN TEACHING SITUATION. (DS)

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AN EVALUATIVE STUDY OF TEACHER CONSTRUCTED TEST ITEMS FOR BSCS BIOLOGY

December 1967

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Final Report

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AN EVALUATIVE STUDY OF TEACHER CONSTRUCTED TEST ITEMS FOR BSCS BIOLOGY

[redacted]

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Fullerton, California

December 1967

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SUMMARY

Test questions available for the BSCS text, Biological Sciences: An Inquiry Into Life (Yellow Version), were felt to be inadequate because: (1) they were developed as quarterly examinations, and (2) they were not adequately tested under classroom conditions. The research study described here was designed to develop a portfolio of multiple choice test items developed by a team of biology teachers. Each item is keyed to specific chapters of the text with each question identified as to the BSCS Theme and Ability Category which it is measuring. In addition, all test items were evaluated under classroom conditions. The nature of the testing group and the special team teaching procedures used are described in the body of the report.

A special point-biserial computer-based program was developed to provide the following information for each test item: (1) the level of difficulty, (2) the ability to discriminate based on an internal criterion (i.e., total test scores), and (3) the ability to discriminate based on an external criterion (i.e., Verbal Reasoning section of the Differential Aptitude Test). The project of this study is a Portfolio of BSCS Test Items of several thousand questions. Each question is preceded by a series of codes designating the Theme and Ability category to which it belongs, in addition to its relative difficulty and power of discrimination from both internal and external criteria. A rationale for selection of appropriate items for difficulty and discrimination is discussed in the report.

This study provides the interested teacher with a field-tested portfolio of chapter-by-chapter test items for one of the BSCS textbooks. It also provides a detailed description of an evaluation procedure that uses data processing facilities. The protocol described for developing test items, for field-testing these items, and for evaluating them could be easily adapted by the teacher groups in test items appropriate to their own teaching situations.

A. INTRODUCTION

Background to Problem:

Historically, the roots of this research project took place in 1962 when the director held his first BSCS In-Service Institute for high school biology teachers. Recognizing the necessity of having teachers fully understand the objectives of this new program in order to teach it effectively, each institute participant was required to write two multiple choice test items for each of the four Ability Outcomes[1] for each chapter of the text, and to write each question within the structure of one of the nine BSCS Themes.[2] Thus, for each class of approximately 20 participants a total of 160 questions was submitted for each textbook chapter. These questions were made available to all members of the institute and a portion of the class time was devoted to analysis and revision of them. The director conducted four such institutes by 1965.

The great quantity of teacher-developed test items accumulated through these institutes led to many requests for complete sets by former institute members and other interested parties. However, it was felt that many of these items were rather rough and in need of careful revision before being released for others to use.

In the spring semester of 1965 a special committee of ten former institute members met weekly in order to sift through, select, revise, and add to this collection of items. The results of this very extensive effort are found in the publication: Portfolio of Test Items, published at California State College at Fullerton, 1965, containing approximately 2500 questions.

The Problem:

As a part of its total evaluative study the Biological Sciences Curriculum Study (BSCS) instituted a program of student evaluation through carefully devised paper-and-pencil type testing, doing so on the basis of long-term periodic examinations. Later, when commercial book companies began printing the various versions of the BSCS texts they also made available to teachers quarterly examinations developed by the BSCS. Unfortunately, these commercially available test items had two shortcomings which restricted their usefulness to the biology teacher: (1) they, too, were long-term, periodic instruments. These were useful, but the teacher often needs a measuring instrument of this nature on a short-term, chapter-by-chapter basis, and (2) these quarterly test items were not evaluated under any field conditions. Again, they were useful, but their utility was limited through the lack of any measurements as to their relative difficulty or their ability to discriminate between high and low achievers on these kinds of tests and for these kinds of students (i.e., high school biology students).

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[1] BSCS, Teachers Handbook (New York: John Wiley and Sons, 1963), p. 457.

[2] Ibid., p. 31.

Recognizing these deficiencies in the commercially available tests and having already collected and refined the above-mentioned test items, a research team comprised of Mr. Vergil Hettick (field investigator), Mr. David Hensley, and Mr. Fred Mangum from Orange High School and Dr. George Turner and Mr. Howard Morton of California State College at Fullerton, Orange County, California, developed the research design described below.

Purpose of Study:

As indicated above, the questions in the portfolio of test items were subjectively evaluated by the committee members, but were not objectively field-tested. Thus, the purpose of this study was to carry out an item analysis of the test questions to determine their suitability in the areas of (1) item discrimination and (2) item difficulty for the kinds of students found in an Orange County School District. The appended description of the students attending this school indicates the nature of this evaluation group.[1] This description of the testing group will be useful to those who may wish to evaluate the relevance of the findings of this study to their own school setting.

However, it was felt that in addition to the internal criterion of success on the total test, an additional criterion, external to the test, would be helpful as a basis for evaluating test items. An external criterion, verbal reasoning ability, permitted a determination of the relationship existing between performance on these items and an important aspect of mental ability as measured by a standardized instrument. The data for this external criterion was available through the school-wide practice of requiring students to take the Differential Aptitude Test (DAT). Scores on the Verbal Reasoning portion of this instrument were used for the purposes of this study.

B. METHOD

A total of 270 senior high school BSCS biology students from Orange High School, Orange, California, were used in the evaluation. A particular feature of this evaluation program rested in the unique team teaching procedure used with these students. In effect, all 270 students were exposed to the same instructors for any given part of the course. These instructors comprised the research team from

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[1] See Appendix A.

Orange High School mentioned earlier. Thus, instructor variability in the final analysis did not present the formidable obstacle it often does in such evaluations.

The questions were given to the 270 students in unit tests of up to three chapters each throughout the school year and were paced with progress in reading the yellow version text, Biological Science: An Inquiry Into Life, 1st edition. Student responses were recorded on "mark-sense" IBM cards which were pre-punched with the student's number (coded to identify period, section, instructor, and roll number), student's name, and test number. The cards were then interpreted and punched. Afterwards, they were fed into the IBM 1620 computer which printed out a scroll with an analysis for each student consisting of percent score, number right, number wrong, and number omitted. For the analysis of the total group the computer provided frequency distributions for the individual scores, cumulative frequencies, distribution of response choices for each item, percentiles, means and standard deviations. Using these data the computer was able to provide the following kinds of information for each question:

1. Level of difficulty (i.e., percent passing the item).
2. Ability of item to discriminate on an internal criterion (i.e., total test score).
3. Ability of item to discriminate on an external criterion (i.e., DAT score).

A special computer program to compute point-biserial correlations (r_{pbi}), developed by a member of the Counseling and Testing staff of California State College at Fullerton, Mr. Howard Morton, was used for this evaluation.[1] This computation calculated the point-biserial correlation coefficient of each item against the two criteria described above. For the internal criterion, this coefficient measured the extent to which performance on a given item related to (predicted) the total test score. A positive value for the coefficient meant that students who passed that item tended, as a whole, to have higher total test scores and that students who failed the item tended to have lower total test scores. A negative value for the coefficient meant that a reverse relationship was true (i.e., those passing the item tended to have lower total test scores, etc.). Ordinarily only items with positive coefficients should be retained for future testing, and those with higher coefficients are generally to be preferred.

For the external criterion the interpretation of r_{pbi} was similar to that given above except that the relationship was with the external criterion (i.e., Verbal Reasoning scores on the Differential Aptitude Test). The following Flow Chart outlines the procedural steps followed in the analyses described above.

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[1] See Appendix B for statistical description of r_{pbi}.

FLOW CHART FOR INVESTIGATION

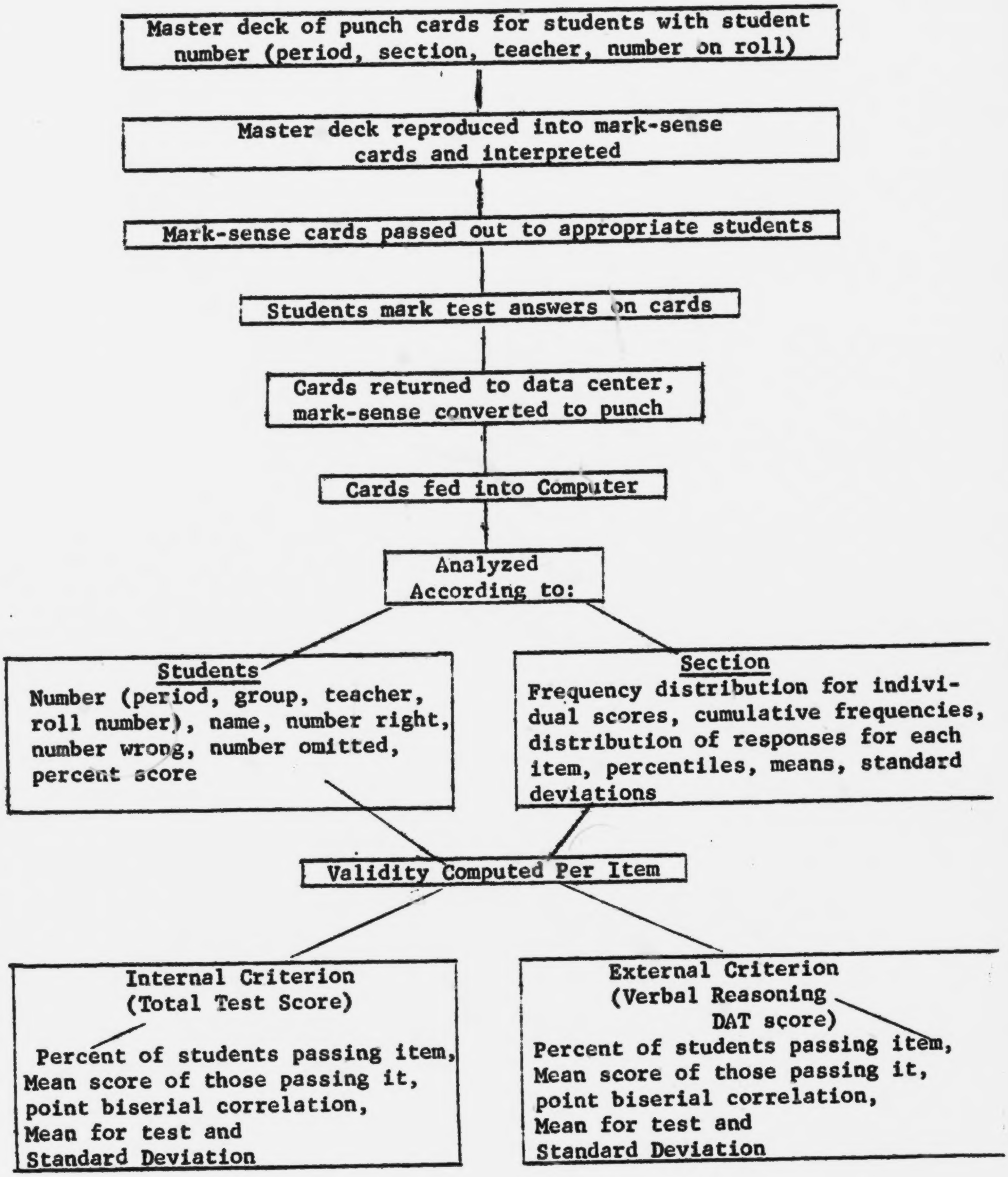
Master deck of punch cards for students with student number (period, section, teacher, number on roll)
Master deck reproduced into mark-sense cards and interpreted
Mark-sense cards passed out to appropriate students
Students mark test answers on cards
Cards returned to data center, mark-sense converted to punch
Cards fed into Computer
Analyzed According to:
Students
Number (period, group, teacher, roll number), name, number right, number wrong, number omitted, percent score
Section
Frequency distribution for individual scores, cumulative frequencies, distribution of responses for each item, percentiles, means, standard deviations
Validity Computed Per Item
Internal Criterion (Total Test Score)
Percent of students passing item, Mean score of those passing it, point biserial correlation, Mean for test and Standard Deviation
External Criterion (Verbal Reasoning DAT score)
Percent of students passing item, Mean score of those passing it, point biserial correlation, Mean for test and Standard Deviation

Figure 1.

C. RESULTS:

The results of this study are handled in two ways. First, a series of tables are presented that indicate the overall computations for the year-long study based on a 50% representative sample of the total test items. These tables show:

I. The distribution of P values for the total sample of test items.[1]

II. The distribution of coefficients of correlation between students' performance on individual items and their scores on the total test of which the items were a part.

III. The distribution of coefficients of correlation between the students' performance on individual items and their scores on the Verbal Reasoning section of the Differential Aptitude Test.

Secondly, the accompanying Portfolio of BSCS Test Items contains each question used and an analysis of each one based on: (1) suggested cut-off points for each of the above categories (rationale for these cut-off points is discussed in the next section), and (2) the BSCS Theme and Ability Category to which each belongs.

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[1] P values designate the proportion of students who passed a particular test item of all students who attempted that item.

As indicated above, Table I shows the frequency distribution of P values for the total sample. For example, under the first column, the three figures appearing on the line starting with the number 21.9 would be interpreted as follows: out of 671 items, there were 17 items that 20.0% to 21.9% of the students were able to pass. Items of this difficulty, or harder, fell at or below the 10.7th percentile.

TABLE I

The distribution of P values and cumulative percentile rankings for the total sample of test items

Proportion Passing (P values)	Frequency	Cumulative Percentile Ranking	Proportion Passing (P values)	Frequency	Cumulative Percentile Ranking
99.9*	1	99.9	49.9	16	43.6
97.9	2	99.8	47.9	28	41.2
95.9	2	99.5	45.9	25	37.1
93.9	8	99.2	43.9	12	33.3
91.9	8	98.0	41.9	15	31.5
89.9	9	96.8	39.9	11	29.3
87.9	9	95.5	37.9	23	27.7
85.9	9	94.1	35.9	15	24.2
83.9	10	92.8	33.9	18	22.0
81.9	19	91.3	31.9	14	19.3
79.9	11	88.5	29.9	8	17.2
77.9	16	86.8	27.9	15	16.0
75.9	16	84.5	25.9	13	13.8
73.9	22	82.1	23.9	8	11.9
71.9	20	78.8	21.9	17	10.7
69.9	21	75.8	19.9	8	8.1
67.9	15	72.7	17.9	11	7.0
65.9	21	70.4	15.9	8	5.3
63.9	20	67.3	13.9	5	4.1
61.9	20	64.3	11.9	7	3.4
59.9	18	61.4	09.9	3	2.3
57.9	27	58.7	07.9	3	1.9
55.9	25	54.6	05.9	4	1.4
53.9	20	50.9	03.9	2	0.8
51.9	29	47.9	01.9	4	0.5

*Values shown are upper limits of intervals

Table II shows the distribution of coefficients of correlation between students' performance on items and their scores on the total test of which the items were a part. For example, under the first column the three figures appearing on the line starting with .219 would be interpreted as follows: 28 out of 671 items had a coefficient of correlation between .200 and .219. Of the 671 items, 44.4% had a coefficient below .220, which designates the relationship between students' performance on a particular item and their performance on the total test.[1]

TABLE II

The distribution of coefficients of correlation between students' performance on individual items and the students' performance on the total test

r_{pbi}[2]	Frequency	Cumulative Percentile Ranking	r_{pbi}	Frequency	Cumulative Percentile Ranking
.699	1	99.9	.219	28	44.4
.679	2	99.8	.199	38	40.2
.659	0	99.5	.179	20	34.5
.639	2	99.5	.159	37	31.5
.619	2	99.2	.139	26	26.0
.599	1	98.9	.119	16	22.2
.579	4	98.8	.099	20	19.8
.559	1	98.2	.079	21	16.8
.539	3	98.0	.059	13	13.7
.519	6	97.6	.039	12	11.7
.499	7	96.7	.019	13	9.9
.479	6	95.6	.001	12	8.0
.459	11	94.7	-.021	10	6.2
.439	14	93.1	-.041	6	4.7
.419	22	91.0	-.061	7	3.8
.399	24	87.7	-.081	1	2.8
.379	33	84.2	-.101	5	2.6
.359	32	79.2	-.121	5	1.9
.339	33	74.5	-.141	4	1.1
.319	32	69.5	-.161	2	0.5
.299	32	64.8	-.181	1	0.2
.279	30	60.0	-.201	0	0.1
.259	37	55.5	-.221	1	0.1
.239	38	50.0			

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[1] See page 4 for discussion of rationale for coefficient of correlation techniques used.

[2] See explanation of r_{pbi} on page 23.

Table III indicates the distribution of coefficients of correlation between the students' performance on items and their scores on the Verbal Reasoning section of the Differential Aptitude Test. For example, under the first column the three figures appearing in the line starting with .159 would be interpreted as follows: 36 out of 669 items had a coefficient of correlation between .140 and .159. Of the 669 items, 51.2% had a coefficient below .160, which designates the relationship between students' performance on a particular item and their performance on the total test.

TABLE III

The distribution of coefficients of correlation between students' performance on items and their scores on the Verbal Reasoning Section of the Differential Aptitude Test (DAT)

r_{pbi}	Frequency	Percentile	r_{pbi}	Frequency	Percentile
.579	3	99.9	.139	43	45.8
.559	0	99.5	.119	45	39.4
.539	0	99.5	.099	27	32.7
.519	2	99.5	.079	34	28.6
.499	3	99.2	.059	32	23.6
.479	1	98.8	.039	22	18.8
.459	3	98.6	.019	21	15.5
.439	0	98.2	-.001	17	12.4
.419	8	98.2	-.021	11	9.8
.399	8	97.0	-.041	12	8.2
.370	18	95.8	-.061	8	6.4
.359	10	93.1	-.081	8	5.2
.339	12	91.6	-.101	6	4.0
.319	29	89.8	-.121	6	3.1
.299	25	85.5	-.141	6	2.2
.279	34	81.7	-.161	3	1.3
.259	21	76.6	-.181	1	0.8
.239	32	73.5	-.201	2	0.7
.219	37	68.7	-.221	0	0.4
.199	51	63.2	-.241	1	0.4
.179	29	55.6	-.261	1	0.2
.159	36	51.2	-.281	1	0.1

*Values shown are upper limits of intervals

As indicated in the second paragraph of this section (Results), the actual Portfolio of BSCS Test Items is properly placed at this juncture in the discussion. However, because of the bulkiness of the Portfolio it is included as appended material,[1] and only the title page and preface are included here.

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[1] See Appendix C

A PORTFOLIO OF BSCS TEST ITEMS

FOR CHAPTERS IN

BIOLOGICAL SCIENCE: AN INQUIRY INTO LIFE

-BSCS - YELLOW VERSION BIOLOGY-

PREPARED BY A COMMITTEE OF
ORANGE COUNTY BIOLOGY TEACHERS

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PREFACE

The enclosed portfolio of test items represent the efforts of over 70 teachers who have participated in BSCS in-service institutes at California State College at Fullerton between 1961-1964. However, the major effort in producing this portfolio was put forth by two special teams of Orange County BSCS Teachers one of which worked over a six month period selecting, refining and originating these test items. The members of this team who deserve special thanks are:

Wayne Daniels	Fullerton High School
Karl Fanning	Brea Olinda High School
John Feaster	La Habra High School
George Francisco	La Habra High School
Sarah Gronstrand	Buena Park High School
Vergil Hottick	Orange High School
Ernest Koch	Troy High School
Tenny Nordstrom	Sunny Hills High School
Gloria Takeda	La Habra High School

The second team was composed of three biology teachers from Orange High School who joined with the coordinator in field testing this portfolio of test items. This year-long evaluation was financed through a grant by the U. S. Office of Education. Members of this evaluation team were:

Vergil Hottick	Principal Field Investigator
David Hensley	
Fred Mangum	

The test items are all of the multiple choice variety. Not that this kind of test item is regarded as the only type to give, but it does have the desirable quality of being a time-saver for the busy teacher, and is regarded as a superior method of pencil-and-paper measurement by most test makers.

The test items are placed into groups according to chapters from the textbook, and within this division according to the ability category the evaluation team felt they belonged.

I. ABILITY CATEGORIES[1]

A. Recall of materials previously learned

B. Application of knowledge to new situations

C. Use of skills involved in understanding of scientific problems

D. Showing of relationships between bodies of knowledge

Further analysis of the questions involved placing each item into an appropriate theme.

II. BSCS THEME:[2]

1. Evolution

2. Diversity of type and unity of pattern

3. Genetic Continuity

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[1] See p. 457, BSCS, Biology Teachers Handbook, John Wiley and Sons, N.Y., 1963

[2] Ibid. p. 31

4. Complementarity of organism and environment

5. Biological roots of behavior

6. Complementarity of structure and function

7. Homeostasis and regulation

8. Intellectual history

9. Science as inquiry

III. PROPORTION PASSING (How difficult the item is)

Below the designations for ability Outcomes (A-C) and Themes (1-9) will be found the designation P with a number ranging from 0 - 100 after it. This letter (P) represents the Proportion of students correctly answering this particular test item. It should be pointed out that approximately 270 tenth grade students at Orange High School, Orange, California, comprised the sample for this evaluation. Thus, the number after the letter P represents the proportion of this total group that answered this item correctly. (i.e. - P 40 would mean that 40% of the 270 students correctly answered this item).

IV. CORRELATION I (How well the item discriminates between high scoring students and low scoring students for that particular chapter examination)

Correlation coefficient for an Internal criterion

Below the designation P is found the code Cor. I with a number ranging between 0-100 after it. This code may be interpreted as indicating how well a particular test item identifies a high scoring student as compared to a low scoring student. The value of this measure as compared to the P measure above, is that a Proportion of say 40% answering an item correctly does not tell us what kind of students they were. (i.e. "good" or "poor" students). We need an additional measure (Cor. I) that will enable us to see how well that test item separates the high students from the low ones.

To be more exact, a positive value for this correlation of Coeffecient (Cor. I) means that students who passed that item tended, as a whole, to have higher total test scores and that students who failed the item tended to have lower test scores. The higher the Cor. I the better this item is in discriminating high from low scoring students.

V. CORRELATION X (How well the item discriminates between students who score high on D.A.T. reasoning ability and those who score low on this aptitude test.)

Below the designation Cor. I is found the code Cor. X with a number ranging between 0-100 after it. This code may be interpreted as indicating how well a particular test item identifies a student who scores high on the Verbal Reasoning section of the Differential Aptitude Test (D.A.T.) as compared to a low scoring student.

This measurement is included to aid the teacher who is inquisitive about the possible relationship between a student's ability to answer a particular test item correctly and his general ability to reason effectively.

Thus a high Cor X number indicates that a student who scores high on the D.A.T. (verbal reasoning section) is more likely to answer that particular test item correctly than would a student who scores low on that section of the D.A.T.

An example of how these codes may appear and how they are to be interpreted may help the reader.

B —— Ability Category B
(Application of Knowledge to New Situations)

3 —— BSCS Theme 3.
(Genetic Continuity)

p 40 — Proportion Passing
(40% of the students answered this item correctly)

Cor. I.35 —— Correlation I

(The ability to answer this question correctly correlates rather well, .35 level, with the ability to do well on the entire chapter examination).

Cor. X .42 —— Correlation X

(The ability to answer this question correctly correlates rather will, .42 level, with the ability to do well on the Verbal Reasoning section of the Differential Aptitude Test.)

This portfolio represents many hours of effort to help the high school biology teacher in this difficult evaluative phase of teaching. Thus, even if some disagreement occurs, we hope the overall utility of the portfolio will make up for the human errors it may contain. A final word of caution. The future usefulness of this portfolio lies in the ability of each recipient to guard carefully against its falling into student's hands. Many teachers will be using test items from this compilation. Thus, if even one teacher lets students have access to any of these items that teacher will, in effect, make the questions useless to all other users, even those in other schools. So please help us to make this effort a lasting and useful one by exerting the greatest precaution in protecting this portfolio.

Dr. George C. Turner, Research Director
Dept. of Science and Mathematics Educatio
California State College at Fullerton

D. DISCUSSION

In order to afford some guidance to the teacher in selecting those items which statistically fall within acceptable levels for item discrimination and difficulty, the following rationale is suggested. For selecting items on the basis of difficulty, the top and bottom 20 percent are suggested as cut-off points. That is, using Table I, those items that 19.9 percent or less of the students passed are judged to be too difficult. Whereas, those items that more than 79.9 percent of the students passed are judged to be too easy. Thus, those test items marked with a P (i.e., proportion passing) between 20.0 and 80.0 are suggested as falling within the limits of acceptability as defined above.

To determine a recommended cut-off point for selecting items on the basis of their ability to discriminate, the students' t-ratio was used.[1] Items whose coefficients of correlation are large enough to be significantly greater than zero (.05 level of confidence) are recommended. Those falling below this level are not recommended. Using this method, the cut-off point for the present study includes all items lying at the .219 level of correlation, and above, in Table II. This computation would include approximately 60 percent of the original test items.

Selection of test items should both reflect the range for an acceptable level of difficulty (i.e., a P value between .219 and .799) and fall above the indicated level of confidence for coefficients of correlation on item discrimination (i.e., a Cor. I value of .219 or higher.

For selecting items on the basis of their relationship to the measure of verbal reasoning, the criterion was determined by using the t-ratio in the same manner as described above.

As indicated under the section on Results, the item/DAT correlation coefficient may be interpreted as indicating how well a particular test item differentiates the student who scores high on the Verbal Reasoning section of the Differential Aptitude Test (DAT) from the low scoring student. In effect, this coefficient indicates the predictive validity of a particular item (i.e., its ability to predict the verbal reasoning of a student). Similarly, the previous coefficients provided us with measures of construct validity for each item (i.e., homogeniety of content), as well as a measure of reliability. Using the .05% cut--off level of confidence, all items with a correlation of .210, or better, indicate a better than chance relationship between getting an item correct and doing well on that particular aptitude test.

The teacher should be cautioned that a high correlation in this measurement is not necessarily desirable, unless a substitute for the DAT is what is wanted. However, the measurement is useful for detecting those items on which a student of high mental ability would most likely do well. Thus, this measurement can be helpful in selecting appropriate test items commensurate with the abilities of students as measured by the DAT. Conversely, teachers may wish to select test items with low DAT correlations in order to gain measurements other than those equivalent to the verbal reasoning abilities of this criterion.

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[1] J.P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Book Company, 1965), p. 163.

E. CONCLUSION

This research design, using special field testing and data processing techniques, enabled the research team to rapidly analyze a large number of separate test items in a relatively short time. This procedure, coupled with the efforts of biology teachers to cooperatively produce test items based on a particular BSCS text, and for the kinds of students found in their teaching situation, has been shown to be a feasible approach to the development of acceptable classroom-tested questions by a small group of interested teachers. This report describes in some detail how the test items were developed, refined, and field tested. The data processing techniques and rationale for selection of appropriate test items based on both internal and external criteria are also fully described, as is the testing group.

It is hoped that with the protocol developed for this study, that other groups of teachers will be able to use this experience in developing their own sets of test questions based on their choice of subject matter and on the kinds of students found in their particular teaching situations.

Although the research design developed for this study may be of particular use to guide others in similar local efforts, the resultant Portfolio of BSCS Test Items that the present effort has produced may be of immediate use to many teachers. Thus, it is recommended that the U.S. Office of Education make funds available to reproduce the Portfolio for interested parties.

It is further recommended that the BSCS, the publishing companies of these books, or some other major group carry out a nationwide effort to develop similar chapter-by-chapter field-tested items for these widely used publications that can be utilized by teachers with students from divergent socio-economic and intellectual backgrounds throughout the country.

APPENDIX

Appendix A

DESCRIPTION OF THE EVALUATION GROUP
Accreditation Report, 1965
Orange High School - Orange, California

F. STUDENT POPULATION

The date under this section should be developed by the Administration Committee and made available to the Instructional Staff Committee(s) for their use and consideration in the study of the section on Student Personnel Services.

1. Data gathered on entering students:
   a. IQ measured by Henman Nelson 8th Grade
   Name of Test
   Form A 6-9 Between Oct. 15-Nov. 15, 1964
   Form Date Given
   Low 67 Q1 94 Median 106 Q3 115 High 145

   *b. Reading levels, measured by Iowa Tests of Educ. Dev. Y-3S
   Name of Test
   Sub tests 5, 6, 7 (Reading, Social Studies; Reading, Natural Science; Reading, Literature) Between Oct.15-Nov.15,1964
   Form Date Given

   Low 3 Q1 50.7 Median 70 Q3 83 High 99

   *c. Arithmetic levels, measured by Iowa Tests of Educ. Dev. Y-3S
   Name of Test
   Y - 3S Between Oct. 15-Nov. 15, 1964
   Form Date Given

   Low 6 Q1 52 Median 75 Q3 90 High 99

2. Data collected in upper grades:
   *a. Reading levels, measured during fifth semester, by
   Iowa Test of Educational Development, X-3S
   Name of Test
   Sub Tests 5, 6, 7, (Reading, Social Studies; Reading, Natural Science; Reading, Literature)
   Form

   Low 1.33 Q1 38.3 Median 61.0 Q3 79.3 High 99

   *b. Arithmetic levels, measured during fifth semester, by Iowa Tests of Educational Development
   Name of Test
   Sub Test 4 (Quantitive Thinking)
   Form
   Low 2 Q1 36 Median 62 Q3 86 High 99

*reported in percentiles

3. Attach a list of all other standardized tests or surveys used during the past five years, giving summary data where applicable. (This should include every type of testing instrument used to gather information regarding students.)

The following tests were given at the junior high school:

a. California Achievement Battery
b. California Test of Mental Maturity (Short Form)
c. Differential Aptitude Battery (Form A)
d. Iowa Tests of Educational Development Y-3S

Additional tests administered at Orange High School:

a. Otis Quick Scoring (Beta and Gamma)
b. SRA Diagnostic Reading - Basic
c. California Test of Mental Maturity (Short Form)
d. Kuder Preference Record Vocational Forms CH is administered regularly to all juniors.

4. Sociological characteristics of student body:

a. Description of any racial or ethnic groups that are important enough that they must be recognized to understand the operation of the school.
NONE

b. Number of students who are transported in school buses 510 . This total represents 22.4 per cent of student body.

5. General summary of student body enrollment as of October 31:

	Boys	Girls	Total
a. Seventh Grade			
b. Eighth Grade			
c. Ninth Grade			
d. Tenth Grade	305	303	608
e. Eleventh Grade	309	303	612
f. Twelfth Grade	542	501	1,043
g. Special classes for physically handicapped minors			
h. Special classes for mentally retarded minors	6	6	12
i. Continuation			
j. Totals	1,162	1,113	2,275

6. Intentions of students who are

a. Tenth Graders

	Junior College	4-Yr. College	Tr.-Tech. School	Work	Mil. as Career	Marr.	Undec.
No. Boys	88	114	21	42	15	7	47
No. Girls	109	105	27	41	4	24	43

b. Twelfth Graders

No. Boys	306	159	19	86	24	18	25
No. Girls	243	117	37	97	0	42	24

Date of Study 11-9-64

7. Stability study for past three years:

Class Entering	School Year 1961 1962	School Year 1962 1963	School Year 1963 1964
a. Fall opening enrollment	705	940	1,019
b. Transfer In	135	224	162
c. Add for sub-total	840	1164	1,181
d. Transfer Out	*103	*193	155
e. Subtract for sub-total	737	971	1,026
f. Spring closing enrollment	737	971	1,016
g. Subtract for drop-outs	No record	No record	10

h. Over the 3-year period, drop-outs left for:

*Includes drop-outs

	Health Marr.	Work	Milit.	Non-Attend.	Other	Total
Number 1961-1962	No record					
1962-1963	No record					
1963-1964		1	2	4	3	10

8. College-entrance data: Last three years.
(Grade averages should be as reported by colleges for freshmen.)

	*	19__ 19__	1961 1962	1962 1963	Totals
a. University of California	(1) (2)			21 2.7	21 2.7
b. State College	(1) (2)			22 2.04	22 2.04
c. Other 4-Year College	(1) (2)			9 2.8	9 2.8
d. Junior College	(1) (2)			204 1.97	204 1.97
e. Total Entering				256	256
f. Per cent of graduating class				50.7	50.7

* (1) Number of students	256
(2) Grade Average	2.065

9. Academic inventory

Note: Suggestions relating to the preparation of this material can be found in James B. Conant's report, "The American High School Today," pages 134-40.

Graduating Class 1964

Number of Boys 359

Number of Girls 421

Number with IQ 115 or above (or above 1 standard deviation above mean of ability test) 163

c. Breakdown of science preparation

Of Upper Group	General Science	Biological Science	Chemistry	Physics	(Name) Other	Other
Boys 83	51	52	72	41-		
Girls 80	40	56	52	7		

10. School records and transcripts

a. What means used to insure against loss of permanent records by fire or theft?
Storage in vault.

b. Do permanent records carry a complete designation of courses as to title, semester, and ability level (if any)?
Yes

c. Do students have access to permanent records? If so, indicate the nature of supervision given.
No.

d. Is the school seal secured to prevent unauthorized use?
Yes.

e. Do transcripts provide the following information?

		Yes	No
1.	Name of school	x	
2.	Address of school	x	
3.	Name and address of school previously attended, if any	x	
4.	Identification of each course by descriptive title, semester, and ability level, if any	x	
5.	Identification of honors courses	x	
6.	Designation of remedial and/or substandard courses	x	
7.	Designation of credit granted	x	
8.	Grade in each course attempted, including withdrawals and incompletes	x	
9.	Notation of college courses taken concurrently with high school attendance, including name of college		x
10.	Date of graduation or withdrawal	x	
11.	Full signature of person making transcript	x	
12.	Date of issuance of transcript	x	
13.	Clear identification of summer session, extension or correspondence courses, military service credit, credit by examination or open circuit TV	x	
14.	Explanation of grading system, if other than 5-letter system	x	
15.	Explanation of all symbols, asterisks, etc., used	x	

APPENDIX B

POINT BISERIAL COMPUTATIONS

Reference	Definition
r_{pbi}	Point biserial correlation (r_{pbi}) is the relationship between two variables, one of which varies in two ways and the other may vary in many ways $r_{pbi} = \frac{M_p - M_t}{r_t} \sqrt{\frac{p}{q}}$ uncorrected for overlap
${}_{pbi}r_{ir}$	$\frac{{}_{pbi}r_{ir} \quad r_{pbi}\,\sigma t - pq}{\sqrt{\sigma t^2 + pq - 2r_{pbi}\,\sigma t\,\sqrt{pq}}}$ corrected for overlap
M_p	mean criterion score of those passing the item
M_t	mean criterion score of total sample
p	proportion passing
q	$q = 1-p$
	Standard deviation of criterion scores for total sample

6-8919
24

A PORTFOLIO OF BSCS TEST ITEMS

FOR CHAPTERS IN

BIOLOGICAL SCIENCE: AN INQUIRY INTO LIFE

-BSCS - YELLOW VERSION BIOLOGY-

PREPARED BY A COMMITTEE OF
ORANGE COUNTY BIOLOGY TEACHERS

PRINTED BY
CALIFORNIA STATE
COLLEGE AT FULLERTON

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ORANGE UNIFIED SCHOOL DISTRICT

PREFACE

The enclosed portfolio of test items represent the efforts of over 70 teachers who have participated in BSCS in-service institutes at California State College at Fullerton between 1961-1964. However, the major effort in producing this portfolio was put forth by two special teams of Orange County BSCS Teachers one of which worked over a six month period selecting, refining and originating these test items. The members of this team who deserve special thanks are:

Wayne Daniels	Fullerton High School
Karl Fanning	Brea Olinda High School
John Feaster	La Habra High School
George Francisco	La Habra High School
Sarah Gronstrand	Buena Park High School
Vergil Hettick	Orange High School
Ernest Koch	Troy High School
Tenny Nordstrom	Sunny Hills High School
Gloria Takeda	La Habra High School

The second team was composed of three biology teachers from Orange High School who joined with the coordinator in field testing this portfolio of test items. This year-long evaluation was financed through a grant by the U. S. Office of Education. Members of this evaluation team were:

Vergil Hettick	Principal Field Investigator
David Hensley	
Fred Mangum	

The test items are all of the multiple choice variety. Not that this kind of test item is regarded as the only type to give, but it does have the desirable quality of being a time-saver for the busy teacher, and is regarded as a superior method of pencil-and-paper measurement by most test makers.

The test items are placed into groups according to chapters from the textbook, and within this division according to the ability category the evaluation team felt they belonged.

I. ABILITY CATEGORIES[1]

A. Recall of materials previously learned

B. Application of knowledge to new situations

C. Use of skills involved in understanding of scientific problems

D. Showing of relationships between bodies of knowledge

Further analysis of the questions involved placing each item into an appropriate theme.

II. BSCS THEME:[2]

1. Evolution

2. Diversity of type and unity of pattern

3. Genetic Continuity

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[1] See p. 457, BSCS, Biology Teachers Handbook, John Wiley and Sons, N.Y., 1963

[2] Ibid. p. 31

4. Complementarity of organism and environment

5. Biological roots of behavior

6. Complementarity of structure and function

7. Homeostasis and regulation

8. Intellectual history

9. Science as inquiry

III. PROPORTION PASSING (How difficult the item is)

Below the designations for ability Outcomes (A-C) and Themes (1-9) will be found the designation P with a number ranging from 0 - 100 after it. This letter (P) represents the Proportion of students correctly answering this particular test item. It should be pointed out that approximately 270 tenth grade students at Orange High School, Orange, California, comprised the sample for this evaluation. Thus, the number after the letter P represents the proportion of this total group that answered this item correctly. (i.e. - P 40 would mean that 40% of the 270 students correctly answered this item).

IV. CORRELATION I (How well the item discriminates between high scoring students and low scoring students for that particular chapter examination)

Correlation coefficient for an Internal criterion

Below the designation P is found the code Cor. I with a number ranging between 0-100 after it. This code may be interpreted as indicating how well a particular test item identifies a high scoring student as compared to a low scoring student. The value of this measure as compared to the P measure above, is that a Proportion of say 40% answering an item correctly does not tell us what kind of students they were. (i.e. "good" or "poor" students). We need an additional measure (Cor. I) that will enable us to see how well that test item separates the high students from the low ones.

To be more exact, a positive value for this correlation of Coeffecient (Cor. I) means that students who passed that item tended, as a whole, to have higher total test scores and that students who failed the item tended to have lower test scores. The higher the Cor. I the better this item is in discriminating high from low scoring students.

V. CORRELATION X (How well the item discriminates between students who score high on D.A.T. reasoning ability and those who score low on this aptitude test.)

Below the designation Cor. I is found the code Cor. X with a number ranging between 0-100 after it. This code may be interpreted as indicating how well a particular test item identifies a student who scores high on the Verbal Reasoning section of the Differential Aptitude Test (D.A.T.) as compared to a low scoring student.

This measurement is included to aid the teacher who is inquisitive about the possible relationship between a student's ability to answer a particular test item correctly and his general ability to reason effectively.

Thus a high Cor X number indicates that a student who scores high on the D.A.T. (verbal reasoning section) is more likely to answer that particular test item correctly than would a student who scores low on that section of the D.A.T.

An example of how these codes may appear and how they are to be interpreted may help the reader.

B —— Ability Category B
(Application of Knowledge to New Situations)

3 —— BSCS Theme 3.
(Genetic Continuity)

P 40 — Proportion Passing
(40% of the students answered this item correctly)

Cor. I.35 —— Correlation I

(The ability to answer this question correctly correlates rather well, .35 level, with the ability to do well on the entire chapter examination).

Cor. X .42 —— Correlation X

(The ability to answer this question correctly correlates rather will, .42 level, with the ability to do well on the Verbal Reasoning section of the Differential Aptitude Test.)

This portfolio represents many hours of effort to help the high school biology teacher in this difficult evaluative phase of teaching. Thus, even if some disagreement occurs, we hope the overall utility of the portfolio will make up for the human errors it may contain. A final word of caution. The future usefulness of this portfolio lies in the ability of each recipient to guard carefully against its falling into student's hands. Many teachers will be using test items from this compilation. Thus, if even one teacher lets students have access to any of these items that teacher will, in effect, make the questions useless to all other users, even those in other schools. So please help us to make this effort a lasting and useful one by exerting the greatest precaution in protecting this portfolio.

Dr. George C. Turner, Research Director
Dept. of Science and Mathematics Educatio
California State College at Fullerton

CHAPTER I

A
8
P .70

Cor.I.40
Cor.X.34

1. What division of biology would a person be studying in attempting to answer questions on how a tree responds to drought, temperature changes, and injury, or how a bird feeds its young, escapes natural enemies, and migrates to distant lands with the change of the seasons?

a. anatomy
b. embryology
*c. ecology
d. genetics

A
8
P .59

Cor.I.26
Cor.X.11

2. A scientist who studies about the functions of cells, tissues, organs and organisms, would be known as a

a. embryologist
b. morphologist
c. ecologist
*d. physiologist

A
8
P .56

Cor.I.40
Cor.X.30

3. In 1878, a French army physician in Algeria found some tiny living organisms in a sample of blood he had taken from a patient ill with malaria. On this information one could conclude

a. malaria was caused by living organisms
b. malaria was caused by living organisms in Algeria
c. malaria organisms are not always found in the blood
*d. not enough information on which a conclusion can be based

A
8
P .42

Cor.I.14
Cor.X.09

4. Fertilization of the Plasmodium organism occurs in the

a. red blood cells
b. liver of man
c. silivary glands of the female Anopheles mosquito
*d. stomach of the female Anopheles mosquito

A
8
P . 7

Cor.I.26
Cor.X.21

5. If we accept the hypothesis - Plasmodium is the cause of malaria - then we can make the deduction

a. plasmodium are host of malaria
*b. all persons ill with malaria should have plasmodium in their bodies
c. elimination of marshes should eliminate plasmodium
d. if plasmodium is the cause of malaria, then all persons drinking from the same water source will come down with malaria

A
4
P .10

Cor.I.06
Cor.X.07

6. When the plasmodium is first introduced into the human body it is carried to the

a. slaivary glands
b. red blood cells
c. stomach
*d. liver

A
8
P.21

Cor.I.04
Cor.X.03

7. Before 1940, the best method of control and prevention of malaria was

*a. draining and placing oil on swamps and other breeding places of mosquitos
b. use of the insect repellent 6-12
c. DDT spray
d. raising insects which feed upon mosquitos

A
8
P .56

Cor.I.41
Cor.X.23

8. Evolution is to homeostasis as change is to

a. environment
b. reproduction
*c. constancy
d. fossil

A
8
P .59

Cor.I.09
Cor.X.09

9. Plasmodium is to malaria as quinine is to

a. South America
*b. treatment
c. quina-quina
d. Romans

A
8
P .17

Cor.I.01
Cor.X-.02

10. Embryology is to development as growth is to

a. maturity
b. adult
c. organism
*d. increase in number of cells

A
8
P .51

Cor.I.32
Cor.X.41

11. Morphology is to physiology as form is to

a. organism
b. structure
*c. function
d. embryology

A
8
P .93

Cor.I.10
Cor.X-.14

12. Which one of the following diseases is transmitted by a mosquito?

a. tetanus
b. diptheria
c. measles
*d. malaria

A
9
P .59

Cor.I.18
Cor.X.18

13. Mosquitos transmit plasmodium, the cause of malaria. It therefore follows that plasmodium should occur in mosquitos. This is called

a. an induction
*b. a deduction
c. a theory
d. a law

A
8
P .77

Cor.I.23
Cor.X.20

14. The seed of a plant germinates, develops and grows into a seedling, the egg of an animal is fertilized, grows and develops into an adult. The study of developmental growth is

a. physiology
*b. embryology
c. biology
d. morphology

A
3
P .85

Cor.I.23
Cor.X.01

15. Animals, plants, and microorganisms are offspring of other living organisms like themselves. This is a statement of fact which best reflects one of the main ideas or themes in biology, namely

a. the complementarity of organism and environment
b. the history of biological concepts
*c. the genetic continuity of life
d. the biological roots of behavior

A
8
P .74

Cor.I.36
Cor.X.23

16. Ross failed repeatedly in his early experiments with human malaria. This was due to the fact that

a. the wrong chemicals were used
b. many mosquitos were killed in the wrong stages of plasmodium development
c. the mature plasmodium was not found in the stomach
d. it was difficult to find which kinds of bird have malaria
*e. he used the wrong kind of mosquito

A
1
P .77

Cor.I.36
Cor.X-.01

17. A study of the remains of ancient life that have been preserved as fossils in the rocks of the earths crust, indicate that plants and animals have ancestoral lines extending back several hundred million years. These ancestoral forms were very different from their descendants living today. The biological theme best illustrated by the fossil record would be

*a. evolution
b. genetic continuity
c. complimentarity of structure and function
d. diversity of type and unity of pattern

A
8
P .80

Cor.I.24
Cor.X.15

18. Malaria has been a biological problem of man for more than 2,000 years. Evidence that it has been a disease of man for such a long period of time

a. can be found in the fossil remains imbedded in the rocks
b. is due to the fact that the plasmodium organism is a lower form of life and therefore appeared on earth long before the origin of man
c. can be found in the logs of early sailing vessels as they transported the bark of the quina-quina tree from South America to Europe
*d. can be found in the writings of ancient physicians as they accurately described the chills, fevers, and recurring attacks of the disease

A
8
P.3

Cor.I.08
Cor.X.04

19. Physiology is the science that deals with

a. structure and function
b. structure and interrelations between living things
c. structure and origin of plants and animals
d. structure
*e. none of these

A
8
P .43

Cor.I.11
Cor.X.14

20. Physiology is the science that deals with

a. structure
b. interrelations between living things and their environment
*c. functions of plants and animals
d. how the plant or animal originated

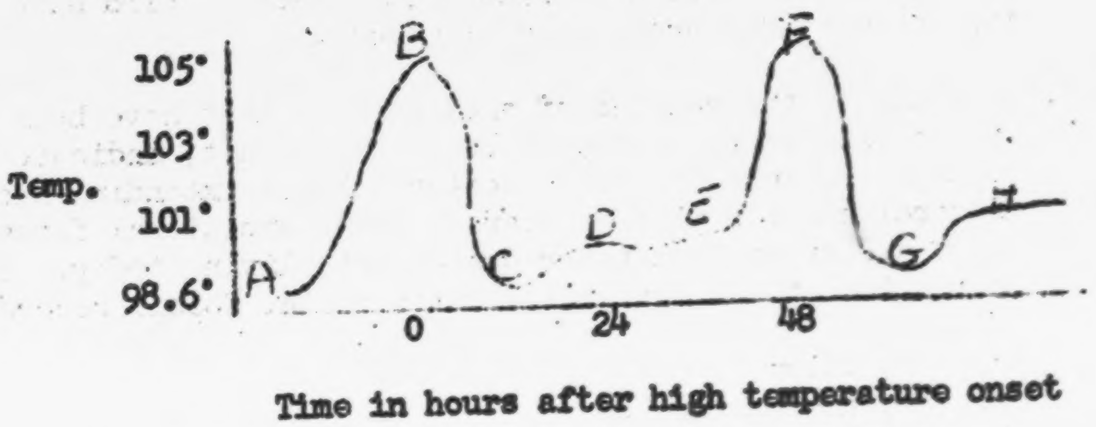
A
8
P .52

Cor.I-.20
Cor.X-.26

21. Anatomy is the science that deals with

a. structure and function
b. structure and interrelations between living things
c. structure and origin of plants and animals
*d. structure
e. none of these

The question below is based on the graph which relates the temperature cycle of a malaria victim and the plasmodium cycle in his blood.



A
9
P.70

Cor.I-.01
Cor.X-.07

22. At which points on the graph will red cells be rupturing and releasing parasites?

a. points A and C
b. points A and E
c. points C and G
*d. points B and F

CHAPTER I

B
4
P .76

Cor.I.11
Cor.X.19

1. Fish live in an aquatic habitat. This is an example of

   a. diversity of type and unity of pattern
   b. complimentarity of structure and function
   *c. complimentarity of organism and environment
   d. biological basis of behavior

B
5
P .23

Cor.I.10
Cor.X-.03

2. The responses of many organisms is clearly related to sensory organs, such as eyes, ears, taste receptors, etc., and to the presence of a nervous system which coordinates the responses of the whole organism. The biological theme indicated by this fact would be

   a. change of living things through time
   b. the complimentarity of structure and function
   c. the complimentarity of organism and environment
   *d. the biological basis of behavior

B
2
P .11

Cor.I-.07
Cor.X-.11

3. Green plants such as moss, grass, lettuce, and maple trees all manufacture their food by photosynthesis. This illustrates

   a. the complimentarity of structure and function
   *b. diversity of type and unity of pattern
   c. growth and development in the individuals life
   d. the biological basis of behavior

B
6
P .68

Cor.I.35
Cor.X.19

4. A strange dead fish is noticed cast upon the shore by waves. Prodding with a stick reveals sharp rows of teeth in both jaws. It is decided that the fish is a voracious flesh eater because of

   a. complimentarity of environment and organism
   b. effects of growth and development
   c. evolution of fish
   *d. complimentarity of structure and function

B
2
P .45

Cor.I.23
Cor.X.11

5. Plants and animals are of many diverse kinds, each adapted to a peculiar niche in a particular environment. Yet by virtue of being a living organism, each share certain characteristics. A characteristic not shared by all organisms is

   a. genetic continuity
   b. homeostasis
   c. growth and development
   *d. sexual reproduction

B
9
P .68

Cor.I.19
Cor.X.18

6. An Anopheles mosquito infected with plasmodium bit a bird, but no infection occurred. The bird did not become infected with the disease because

   a. no plasmodium was injected into the bird
   *b. the particular kind of plasmodium could not grow in the bird
   c. plasmodium never infects birds
   d. plasmodium only grows in mosquitos

B
3
P .61

Cor.I.30
Cor.X.26

7. The step in the life cycle of the malaria parasite in which the life cycle could be most easily broken would be in the

*a. mosquito
b. liver of the human host
c. red blood cells of the human host
d. blood stream of the human host

B
8
P .65

Cor.I.42
Cor.X.30

8. On a flight from Los Angeles to Peru, the pilot was forced to parachute from his burning plane over the jungles of Ecuador. Malaria is quite wide-spread in this part of the world. The pilot could best protect himself against malaria by

a. eating the bark of the quina-quina tree
*b. eating the bark of the cinchona tree
c. drinking only the water collected from squeezing plants
d. drinking curare

B
3
P .72

Cor.I.23
Cor.X.27

9. Coelacanths, a lobed-fin fish, were believed to have lived as long as 350 million years ago and to have become extinct about sixty million years ago. In 1938, a coelacanth was caught in deep waters off the coast of Africa which possessed all the characteristics previously studied of its fossil remains. Of all living things, they are believed to have lived longest on earth without change. The biological theme best illustrated by this important find would be

a. evolution
*b. genetic continuity
c. complimentarity of structure and function
d. diversity of type and unity of pattern

B
9
P .29

Cor.I.36
Cor.X.26

10. Anopheles mosquitoes are present in California, yet the incidence of malaria is extremely low. The reason for the rarity of malaria infected mosquitoes may be

a. there are few available swamps
b. most people have quinine included in their diets
*c. there are few malaria victims for the mosquitoes to bite
d. mosquitoes are confined to sparcely populated areas

B
1
P . 7

Cor.I.40
Cor.X.11

11. You would be studying evolution, if you

a. were counting the number of petals on a flower
b. were taking you pulse rate before and after running a race
*c. were looking at the fossilized skeleton of a dinosaur and noticing its similarities to the skeleton of a chicken
d. were studying the the characteristics of corn plants to be used to produce hybrid seed corn

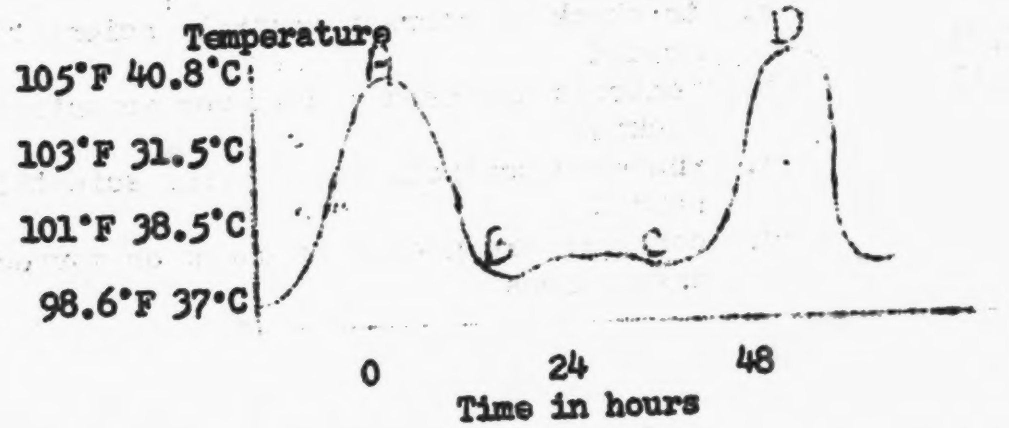
B
9
P.13

Cor.I.23
Cor.X.13

12. What is the significance of the relationship between the use of controls and scientific assumptions in experiments?

a. to check or correct controls scientific assumptions are needed
b. controls are needed whenever scientific assumptions are lacking
c. whenever controls are lacking scientific assumptions are needed
*d. controls are needed to check or correct scientific assumptions

The next question refers to the diagram below.



C
7
P .53

Cor.I.33
Cor.X.23

1. The period of time between A and B would indicate the return of the body temperature to normal. The biological theme illustrated by this fact would be

   a. genetic continuity of life
   b. complimentarity of structure and function
   *c. regulation and homeostasis
   d. the biological basis of behavior

C
9
P .34

Cor.I.24
Cor.X.17

2. In a ten year study of a community in South America it was found that sixty per cent of the population contacted malaria. It was also found that during this ten year study there was a high correlation between the number of mosquitoes and new malaria cases. Shortly after this study, the economy of this agricultural community was changed by the introduction of a new agricultural crop. This crop not only became the major staple in their diet but also the major export. The increased prosperity of the community enabled them to construct a water purifying system and a sewage disposal plant. Along with this prosperity the people enjoyed more leisure time for activities such as fishing. To satisfy their fishing craze, new species of fish were introduced into the numberous nearby lakes and streams. Five years later, it was found that the incidence of new malaria cases had dropped to about one-half of the original number.

   The factor most likely responsible for the dramatic decrease in malaria cases could be attributed to the fact

   a. a change in the diet made the people healthier.
   b. the proper treatment of sewage prevented the spread of the disease
   c. the purification of the water source reduced the chances of contacting the disease
   *d. the new species of fish were probably eating the mosquito larvae.

C
9
P .59

Cor.I.25
Cor.X.08

3. After making a comprehensive study of ecology a biologist would be correct in deciding that all of the following would support his theories in ecology except

a. man wears warm clothing in cold climates
b. sea gulls will follow anchovy schools
c. ducks nest near bodies of water
d. angle worms are never found in sandy dry soil, because the worm must remain moist
*e. man cannot fly because his hands are not large enough, nor strong enough

C
3
P .78

Cor.I.45
Cor.X.12

4. Your text makes this statement, "Life is the ability of animals and plants to maintain themselves and to reproduce themselves." All of the following confirm this statement except

a. broken bones will mend
b. animals give birth to young
c. good food will make children grow
*d. glaciers grow and increase in size
e. warm blooded animals are prone to take care of their young

CHAPTER II

A
8
P .56
Cor.I.29
Cor.X.23

1. What great scientist disproved the idea of abiogenesis?

*a. Pasteur
b. Dujardin
c. Schwann
d. Needham
e. Spallanzani

A
8
P .72
Cor.I.25
Cor.X.19

2. During his studies on biogenesis, Pasteur took his flasks up in the Alps to expose them to the air because at that altitude he thought there was

a. less oxygen in the air
*b. fewer organisms in the air
c. no life giving substance in the air
d. less pressure in the air

A
8
P .81
Cor.I.27
Cor.X.22

3. Of the following, who was a biogenesis?

*a. Pasteur
b. Needham
c. Pouchet
d. Aristotle

A
8
P .13
Cor.I.14
Cor.X-.07

4. Spallanzani criticised Needham's experiments on spontaneous generation by maintaining that Needham had not heated his test tubes sufficiently to kill all living things within them. Abiogenists reacted by maintaining that sealing flasks destroyed the

*a. active principle
b. food source within the fluid
c. reproductive capacity of the organisms
d. air needed for respiration

A
8
P .80
Cor.I.30
Cor.X.23

5. Spontaneous generation is the concept that

a. one generation resembles the previous generation
b. life comes from life
c. offspring of succeeding generations are very different
*d. life comes from non-life

A
8
P .71
Cor.I.30
Cor.X.23

6. One of the first to describe microscopic life was

a. Pasteur
*b. Leeuwenhoek
c. Redi
d. Joblot
e. Needham

A
8
P .61
Cor.I.33
Cor.X.18

7. If Pasteur had used a hay infusion instead of yeast, water, and sugar, he would have very likely obtained growth in some flasks which he did not anticipate growth because

a. hay infusion is better food than yeast, sugar, and water
b. it is easier to contaminate a hay infusion
c. microorganisms will spontaneously generate in a hay infusion
d. hay infusions are capable of supporting life, the yeast, sugar and water are not
*e. all organisms in a hay infusion may not be killed by boiling

A
8
P .34
Cor.I.17
Cor.X.16

8. When Needham performed his experiments in support of abiogenesis, he assumed all of the following except

a. that air contained an active principle
b. that microscopic organisms cannot reproduce themselves
c. excessive heat kills the active principle
*d. microorganisms can flourish in sterile media only when they are introduced into the media

A
8
P .56
Cor.I.15
Cor.X-.06

9. The chief importance of Redi's work towards the advancement of scientific knowledge was

a. his discovery that maggots were a stage in the life cycle of flies
b. his findings were accepted by most scientists of that period
*c. that he tested his beliefs with observation and experimentation
d. he proved once and for all the beliefs of the abiogenesists

A
4
P .92
Cor.I.29
Cor.X.24

10. Which one of three jars containing raw meat would more likely have larve growing in it, (if flies were flying around the jars)?

*a. a jar uncovered
b. a jar covered with a porous cloth
c. a jar sealed air tight
d. a jar with a glass covering

CHAPTER II

B
4
P .68

1. Pasteur's experiments were significant in terms of advancement of modern medicine because they showed that

Cor.I.30
Cor.X.20

*a. microorganisms are carried through the air
b. spontaneous generation occurs only under controlled conditions
c. sterile media may harbor microorganisms
d. flies do not lay eggs in broth that was boiled

B
9
P .62

2. Milk from the grocery store will spoil in a warm room due to the action of bacteria. In this regard which statement is false?

Cor.I.19
Cor.X.16

*a. the bacteria spontaneously develop from the milk
b. the milk contained a small number of bacteria
c. the bacteria grow when the milk became warm
d. bacteria can use milk for food

CHAPTER II

C
9
P .36
Cor.I.09
Cor.X.09

1. A man living several hundred years ago was convinced that earthworms were created through some mysterious combination of water and soil. It was quite evident to him that after each rainfall his backyardwas covered with earthworms. Which of the following methods would have been most useful in attempting to determine the validity of this man's beliefs?

a. artificially pouring water on his backyard to see if earthworms still appeared
b. mixing some soil and rainwater in a container and seeing if any worms developed
c. placing some soil in containers and exposing them to rain to see if any worms developed
*d. none of the possible choices would give substantial evidence to disprove the man's idea

C
9
P .66
Cor.I.35
Cor.X.16

2. When a scientist repeatedly finds himself unable to find the answer to a problem, he should

a. give up this problem as it is not valid
b. start over
*c. check the question - is it a valid question
d. none of these

C
9
P .50
Cor.I.10
Cor.X.12

3. In conducting an experiment, you obtain results which are the opposite of those which have been obtained by a colleague. What would be the first thing you might do?

a. immediately notify your colleague of the discrepancy
b. re-run your experiment
*c. re-check your findings to see if an error had been committed
d. design another experiment to check the results

C
9
P .62
Cor.I.44
Cor.X.49

4. The difficulty in setting up a control for an experiment is that there is no guarantee that you can

a. find a control for the experiment
*b. recognize all the variables that may affect the outcome
c. keep accurate records of the results
d. separate the significant and insignificant facts

C
9
P .72
Cor.I.24
Cor.X.22

5. Needham heated a nutrient fluid and placed it in a sealed test tube. The fluid was heated again. In a few days the fluid contained a large number of microorganisms. His work was accepted as proof of abiogenesis. Spallanzani said that the experiments might not have been valid because the nutrient fluid was not heated long enough to kill all life. Needham answered by saying that more heating would have destroyed the active principle of the air or food material. Today we would expect Needham to defend his work by

a. asking other scientists to support his views
b. remaining silent and ignoring the criticism
*c. conducting more experiments to test his view
d. repeating his same experiment

C
9
P .23

Cor.I.20
Cor.X.26

6. "At the beginning of June, I ordered to be killed three snakes, the kind called eels of Aesculapius. As soon as they were dead, I placed them in an open box to decay. Not long afterwards, I saw that they were covered with worms of a conical shape and apparently without legs. On the nineteenth day of the same month some of the worms ceased all movements, as if they were asleep, and appeared to shrink and gradually to assume a shape like an egg. I placed those (pupae) separately in glass vessels, well covered with paper, and at the end of eight days every shell of the red (pupae) was broken, and from each came forth a fly of a gray color."

From this detailed report of Redi's observations, we know

a. this is an example of a control which all scientists should follow in performing an experiment
b. all worms conical in shape and without legs will develop into flies
c. all life can come only from pre-existing life
*d. some pupae develop into flies

C
9
P .65

Cor.I.39
Cor.X.15

7. Communication between scientists is valuable because it provides for

a. a chance to find out how poorly other scientists are performing
b. a chance for others to find out how important you work is
*c. a chance for others to confirm you results
d. a chance for you to meet other scientists
e. a chance for you to feel wanted

C
9
P .73

Cor.I.45
Cor.X.31

8. Redi designed experiments to support his belief in biogenesis, or life from life. In order to disprove spontaneous generation, he observed decayed flesh in open and closed flasks. A short time later worms appeared in open flasks, but none occurred in the closed ones. Flies were observed in the open flasks, but could not enter the closed ones. His experiment demonstrated that

a. worms need only decayed flesh in order to develop
b. an open container is better because it receives more air
*c. flies could enter the open container and lay eggs
d. abiogenesis is true under certain experimental conditions

C
8
P .53

Cor.I.22
Cor.I.32

9. Spallanzani put hay infusions into eight containers and boiled all of them. Four were carefully closed with corks. The other four were closed with airtight seals. The results were dramatic. There were abundant growth of organisms in all the vessels closed with corks. There were no organisms in the vessels with airtight seals. This is good evidence to support the biogenesis hypothesis. What is a logical argument against this evidence?

a. one experiment doesn't provide enough data
*b. the four vessels with airtight seals deny entrance of vital ingredients necessary for spontaneous generation
c. organisms grow in four vessels and not in the remaining four, therefore, spontaneous generation occurs on a 50-50 basis
d. spontaneous generation can occur only under normal conditions

CHAPTER II

D
8
P .73

Cor.I.29
Cor.X.05

1. Bread placed in a warm, damp place became covered with mold in a few days. Which statement is true in this situation?

   a. the mold would have grown there without the bread
   b. the fungi that produced the mold developed spontaneously from the bread
   *c. the fungi grew when the bread became damp and warm
   d. the fungi did not grow in the air

CHAPTER III

A
8
P .49

1. Animal cells were recognized many years later than plant cells because

Cor.I.42
Cor.X.33

a. animal cells are smaller
b. animal cells are more difficult to obtain
*c. animal cells have no cell walls
d. animal cells are not as interesting as plant cells
e. animal cells contain no nuclei

A
8
P .46

2. Schwann was able to deduce that bodies of plants and animals were made up of cells. His deduction was based on his observation that

Cor.I.06
Cor.X.09

a. plant and animal cells are enclosed within a boundry
*b. plant and animal cells have nuclei
c. plant and animal cells contain a watery substance
d. plant and animal cells are the same in shape and size

A
6
P .72

3. One of the following is not a similarity of all cells. Which one is it?

Cor.I.34
Cor.X.29

a. cells are the building blocks of life
*b. cells contain chlorophyll
c. a cell with its nucleus is the smallest structural unit common to plants and animals
d. cells contain a nucleus

A
8
P .72

4. The cell structures that are commonly found in both plants and animal cells are

Cor.I.33
Cor.X.05

a. the centriole and the spindle
b. the cell wall and the cytoplasmic membrane
*c. nuclear membrane and the nucleoli
d. chloroplasts and the mitochondria

A
8
P .86

5. When Robert Hooke first looked at the rigid box-like structures that made up cork, he wasn't really looking at cells because

Cor.I.26
Cor.X.22

a. cells haven't been discovered yet
b. the material only looked like cells
*c. he was looking at just the cell walls
d. cork is not made of cells

A
8
P .86

6. The significance of Robert Hooke's micrographia was

Cor.I.31
Cor.X.01

a. an unimportant biological link
*b. the first documented information to describe cells
c. containing of information describing why cork was springy
d. the explanation why cork was light

A 7. The most abundant compound found in the living cell is
6
P .56 a. oil
b. carbohydrate
Cor.I.24 *c. water
Cor.X.25 d. proteins

A 8. Theodore Schwann's major contribution to the development of
8 the Cell Theory was
P .27 a. his belief that all cells came from pre-existing cells
Cor.I.36 b. his proof that all plants were composed of cells
Cor.X.35 *c. his concept that a cell was a structure with a nucleus
rather than a structure with a thick cell wall
d. his published findings in his book, Micrographia, thus
preserving his work for future investigations

A 9. Which of the following statements does not apply to both plant
2 and animal cells?
P .51 a. chromosomes control the activities of the cell
Cor.I.17 b. mitochondria, structures in the cytoplasm, convert food
Cor.X.11 into energy for use by the cell
c. the cell membrane controls everything that enters or
leaves the cell
*d. the centrioles and asters are necessary for the cell to
divide

A 10. You were asked to identify a sample of tissue as to whether
8 it was plant or animal in origin. The simplest way to decide
P .42. would be to determine if the cells possess
Cor.I.20 a. chlorophyll
Cor.X.22 b. a nucleus
*c. a cell wall
d. mitochondria

A 11. Robert Hooke's major contribution to the field of biology was
8
P .34 a. his discovery of cells in cork
b. his discovery that the cells were filled with air, thus
making cork light and capable of floating
Cor.I.22 *c. his published report stimulated other investigations
Cor.X.18 d. naming the structures which he observed in the cells

A
6
P .64

Cor.I-.02
Cor.X.03

12. What is the significance of the relationship between a cell in animals and plants?

a. a cell is the largest living structural unit common to all animals and plants
*b. a cell is the smallest living structural unit common to all animals and plants
c. a cell is the largest living structural unit common to all animals and a few plants
d. a cell is the smallest living structural unit common to a few animals and all plants

A
2
P .74

Cor.I.33
Cor.X.23

13. One of the most marked differences between animal cells and plant cells is that

a. plant cells usually have one or more vacuoles
b. animal cells ordinarily have a nucleolus within the nucleus
c. animal cells have their nuclear chromatin attached to the linin fibers
d. nucleoplasm is unique to the animal cell
*e. plant cells usually have relatively thick, rigid walls

A
2
P .32

Cor.I.14
Cor.X.19

14. Which one of the following is characteristic of the elodea cell but not of a cell lining the inner cheek?

a. nucleus
b. cytoplasm
*c. cell wall
d. cell membrane
e. protoplasm

A
2
P .59

Cor.I.47
Cor.X.26

15. Plant cells differ from animal cells in having

a. cell membrane
b. chromosomes
c. nucleus
*d. cell wall
e. asters

A
8
P .46

Cor.I.43
Cor.X.38

16. The thread-like structures in the nucleus of the cell are

a. chloroplasts
b. nucleoplasm
*c. chromosomes
d. granules
e. golgi bodies

A
8
P .30

Cor.I.30
Cor.X.13

17. Which structure is not present in the cytoplasm of a plant cell?

a. mitochondria
*b. centriole
c. granules
d. vacuoles
e. chloroplasts

A
6
P .54

18. The structures in the cell that controls and regulates cell activities and functions in transmissions of heredity factors is the

Cor.I-.09
Cor.X-.07

- *a. nucleus
- b. cytoplasm
- c. plasma membrane
- d. vacuole
- e. centrosome

A
8
P .47

19. Schwann was able to deduce that bodies of plants and animals were made up of cells. His deduction was based on his observation that

Cor.I-.05
Cor.X.06

- a. plant and animal cells are enclosed within a boundary
- *b. plant and animal cells have nuclei
- c. plant and animal cells contain a watery substance
- d. plant and animal cells are the same in shape and size

A
6
P .46

20. What is the significance of mitochondria structures in cytoplasm?

Cor.I.20
Cor.X.17

- a. digest food
- b. excrete waste
- *c. provide energy
- d. circulate food

A
7
P .87

21. What is the significance of the chromosomes to the cells?

Cor.I.29
Cor.X.28

- a. they digest food in cells
- b. they circulate food in cells
- *c. they control the activities in cells
- d. they excrete waste from the cells

A
8
P .72

22. Which of the following would be found in an organ (as the heart)?

Cor.I.30
Cor.X.33

- a. cells and systems
- b. tissues and organisms
- c. organs and cells
- d. tissues and systems
- *e. cells and tissues

A
6
P .37

23. Considering the many parts of a cell, either plant or animal, which one of the following does not appear in plant cells?

Cor.I.26
Cor.X.26

- a. nucleus
- b. cell wall
- c. cell membrane
- *d. centrioles
- e. mitochondria

B
9
P .50
Cor.I.16
Cor.X.28

1. A biologist fixed and stained a thin slice of animal tissue. Upon examination with a light microscope he saw some peculiar U-shaped structures in the cytoplasm. In order to learn more about them he tried to locate them in living cells, using a phase-contrast microscope. He could not locate them. He could conclude that

   a. he used the wrong stain
   b. the phase-contrast microscope was not powerful enough
   *c. the structures were caused by fixing and staining
   d. the structure will show up in living cells if enough cells are examined

B
8
P .37
Cor.I.18
Cor.X.36

2. Golgi bodies are thought to be concerned with cell secretions. If the statement is made that golgi bodies do secrete materials then it can be stated that secretions will be found in the golgi bodies. This is

   a. a hypothesis
   *b. a deduction
   c. a falsehood
   d. an induction

B
6
P .35
Cor.I.32
Cor.X.20

3. In view of the fact that living organisms do not contain any chemicals not found in non-living matter, which of the following statements is probable?

   *a. life's uniqueness is not due to its chemical components
   b. non-living and living forms may have similar points of origin
   c. non-living matter (rocks, minerals, etc.) was probably living at one time
   d. it is probably just coincidental that this chemical similarity exists

B
6
P .69
Cor.I.25
Cor.X.16

4. What is the significance of the presence of chlorophyll in some plant cells to the entire animal kingdom?

   a. chlorophyll enables the plant to store large quantities of water thus making it available for animals
   *b. chlorophyll enables the plant to manufacture the food for which all animals are dependent
   c. chlorophyll reflects the greatest part of the suns rays thus preventing the earths temperature from becoming so hot that it would be incompatible for animal life
   d. chlorophyll is converted into cellulose which is the major source of food for most animals.

B
6
P .75

Cor.I.39
Cor.X.21

5. A crime laboratory obtained a sample of some cells from the bumper of a car of a suspected hit-and-run driver who killed a person. If the cells prove to be from a plant the driver will be released. If the cells are of animal origin the driver will be detained. The driver would be released if the following were found characteristic of the cells

a. cell membrane and nuclei
b. mitochondria and chromosomes
c. cytoplasm and spindles
*d. cell walls and chloroplasts

B
9
P .32

Cor.I.25
Cor.X.23

6. A biologist looked at cells in a frog muscle and observed that these cells contain nuclei but lacked cell walls. The observation of nuclei but no cell walls in the frog muscle cells is best termed

a. a hypothesis
*b. data
c. conclusion
d. assumption

B
9
P .47

Cor.I.19
Cor.X.13

7. A microscope has a 12X eyepiece, a 10X objective lens, and a 50X objective lens. Using this microscope, what is the total magnification under high power?

a. 22X
b. 62X
c. 72X
d. 120X
*e. 600X

B
6
P .53

Cor.I.18
Cor.X.15

8. What is the significance of the observed fact that, for the most part, only plant cells have cell walls?

a. plant cells can grow larger than animal cells
b. animal cells are not as interdependent as plant cells
*c. plant cells are generally more rigid than animal cells
d. since cell walls are relatively impermeable, it is difficult for materials to enter or leave plant cells

B
1
P .75

Cor.I.25
Cor.X.17

9. The basic similarity of plant and animal cells in both structures and function may be explained on the basis of

a. coincidence
b. crossing of primitive plants and animals
*c. possible common origin of plants and animals
d. inability of life to exist in any other structure

CHAPTER III

C
6
P .56

Cor.I.28
Cor.X.17

1. A scientist hypothesizes that a nucleus is essential to the life of the organism. Which of the following observations would support his hypothesis?

   a. animal and plant cells, as seen under a microscope, contain nuclei
   *b. removal of the nucleus is followed by death of the cell
   c. nuclear division precedes cytoplasmic division
   d. the nucleus has a permeable membrane

C
9
P .51

Cor.I.34
Cor.X.16

2. Which of the following would be the best method of finding out if nuclei are necessary for the life of a cell?

   a. observe living cells that contain no nuclei (as red blood cells)
   b. watch cells undergo mitosis
   c. chemically analize the structure of the nucleus
   d. observe the effect of a higher temperature on the cells
   *e. remove nuclei from living cells and observe the results

C
9
P .45

Cor.I.39
Cor.X.18

3. You are studying the effects of light on growth of bean plants. Assume normal growth occurs if all usually recognized factors for growth are supplied. If the experimental plant is given all factors except the plants are grown in the dark, under what conditions would the control be grown?

   *a. with adequate water, minerals, and light
   b. with reduced water, minerals, and light
   c. with reduced water and minerals, but adequate light
   d. with reduced water, but adequate light and minerals

C
8
P .25

Cor.I-.04
Cor.X-.01

4. The early scientists of Hooke's time believed that the center of plant cells were empty. This conclusion was probably due to the fact that

   a. microscopes were inadequate
   *b. cell walls were the prominent structures
   c. most of the cell structures are around the outside
   d. large liquid-filled structures called vacuoles often filled the middle of the cell

C
9
P .44

Cor.I.33
Cor.X.23

5. Some dyes will selectively stain specific structures in a cell so that they may be studied in detail with the aid of the microscope. As an example, hematoxylin will stain the nucleus much more than other parts of the cell. In recent years it has been found that cellular structures have their own unique chemical properties. Knowing this, what is the best assumption of the following choices?

*a. some chemicals will react with some dyes more readily than others
b. dyes will react with cell structures depending on their location in the cytoplasm
c. there is no relationship between the dye and the chemical properties of cell structures
d. not enough information given to make any assumption

C
6
P .56

Cor.I.45
Cor.X.49

6. When the nucleus is removed from an amoeba life activities continue for a short time and then cease. Upon repeating this experiment, using other amoeba, the same results are obtained. On the basis of this information we can conclude that

a. the nucleus is the only living part of the amoeba
b. the nucleus is the most important structure in a cell
*c. the nucleus has a definite bearing on the life functions in the amoeba
d. a nucleus is necessary for life in all cells

C
3
P .48

Cor.I.12
Cor.X.12

7. It would seem logical that the largest cells e.g. bird eggs, produce the largest creatures. This is incorrect because

a. it is the shape of the cells that controls size
*b. the chromosomes determine the size
c. the size is predetermined already
d. the nucleolus determines the size
e. the size of the organism is controlled by the amount of amino acid present

C
6
P .30

Cor.I.40
Cor.X.25

8. The nucleus is removed from an amoeba. Life activities continue for a short time and then cease. Upon repeating this experiment, using other amoebae, the same results are obtained. Based on this information, which, if any, of the following conclusions apply?

a. the nucleus is the only living part of the amoebae
b. an amoeba cannot live without a nucleus
c. the nucleus is the most important structure in the cell
*d. the nucleus has a definite bearing on life functions in the amoeba
e. a nucleus is necessary for life in all cells

C
9
P .77

9. You think that you have found some cells that can live well without a nucleus. An experiment you might perform to gain evidence for this is

Cor.I.39 a. watch the nuclei for any activity in twenty cells
Cor.X.15 *b. remove the nuclei from only ten of twenty cells and observe all twenty
c. remove everything from twenty cells and observe all twenty
d. cut the nuclei of only ten of twenty cells in half and observe all twenty

C
9
P .38

10. A biologist cuts a thin slice of some animal material to study the structure of the cells. Next the slice of cells are stained. Under the microscope the structures of the cells are obviously distorted. The most probable reason is

Cor.I.35 a. the microscope was not working right
Cor.X.07 b. the stain was too dilute
*c. the cells were not fixed first
d. the cells were too small to be seen

C
8
P .40

11. The school custodian brought in some scum that has appeared in the school swimming pool. We can determine whether the scum consists of plant or animal matter if

Cor.I.45 a. it is uniform in color
Cor.X.33 b. has cells containing nuclei
c. is reproducing
d. has cells with very thin walls
*e. has cells with very thick walls

CHAPTER III

D
6
P .37
Cor.I.12
Cor.X.06

1. Mature red blood cells do not contain a nucleus. Therefore, we can assume that

   a. the cells never had a nucleus
   *b. the mature cells cannot divide
   c. the mature cells will only live a few hours
   d. the cells contain DNA, but not in an organized nucleus

D
6
P .40
Cor.I.12
Cor.X.13

2. We have learned that both plant and animal cells have a nucleus. We also know that the nucleus is important in cellular division. What statement can we make about red blood cells, when we are told that when they are mature they lack a nucleus?

   a. the information given is incorrect
   *b. red blood cells do not divide
   c. the red blood cells must divide by simple fission
   d. since the red blood cells are not living cells

D
6
P .17
Cor.I.13
Cor.X-.03

3. A certain chemical can be added to cells to prevent the centrioles and asters from functioning during mitosis (cell division). After adding this chemical to some cells, a biologist examined them under a microscope and found the cells in the process of mitosis. The biologist could correctly assume that he was looking at

   a. animal cells
   *b. plant cells
   c. could be either plant or animal cells
   d. not enough information is known about this situation to make an assumption

D
9
P .40
Cor.I.11
Cor.X.06

4. A scientist was given an unknown slide of tissue. He found it to be of an animal because

   a. all the cells were boxlike
   b. the cells contained cell membranes
   *c. the cells in process of division contained spindles, chromosomes, and cell membranes in an oval shape
   d. he couldn't stain the cell's cytoplasm
   e. none of the above proved it to be animal

CHAPTER IV

A 1. The application of chemistry to biological materials is known as
8
P .86

a. ecology
Cor.I.25 b. botany
Cor.X.19 *c. biochemistry
d. inorganic chemistry
e. evolution

A 2. The first man to synthesize an organic compound from an inorganic compound (taken from an inorganic substance) was
8
P .92

a. Dalton
Cor.I.13 *b. Kolbe
Cor.X.03 c. Priestly
d. Wohler
e. Lavosier

A 3. Aristotle felt that all life was associated with three different kinds of psyche - animal, vegetable and rational. Man's psyche was different from the others in
8
P .92

Cor.I.13 a. responsiveness
Cor.X.25 *b. ability to reason
c. growth
d. reproduction
e. movement

A 4. The Vitalist Theory that life is a unique force belongs to
8
P .93 a. Descartes
*b. Aristotle
Cor.I.03 c. Dalton
Cor.X-.08 d. Socrates

A 5. All of the following are related to Dalton's theory except one
8
P .84

a. elements are made up of atoms
Cor.I.39 b. one difference between the atoms of different elements is their weight
Cor.X.19
c. atoms of one element differ from atoms of another element in their ability to unite
*d. some elements have two kinds of atoms
e. atoms of a single element are the same

A 6. Burning phosphorus in a closed vessel describes an experiment by
8
P .63 a. Priestly
b. Aristotle
Cor.I.31 *c. Lavoisier
Cor.X.34 d. Dalton
e. Wohler

A
8
P .32
Cor.I.24
Cor.X.12

7. J.D. Von Helmont's experiment with the willow tree was to determine

a. Aristotle's hypothesis on spontaneous generation
b. how much earth was needed to grow a tree of 164 pounds
*c. if, after the experiment, the earth in the pot weighs the same
d. what elements (food) were required to grow a tree and from what source did those elements come

A
8
P .68
Cor.I.36
Cor.X.11

8. Vitalism was Aristotle's philosophy that

a. man is vital in the overall scheme of life
*b. life is made possible by a force neither chemical or physical
c. knowledge of the physical world is vital to the concept, Know Thyself
d. knowledge of ones self is essential to the vital difference between man's life and animal life
e. none of these

A
8
P .48
Cor.I.32
Cor.X.18

9. Descartes suggested that the rational soul of man might be located in the

a. frontal lobes
b. medulla oblongata
*c. pineal body
d. heart
e. liver

A
8
P .46
Cor.I.07
Cor.X.09

10. The modern atomic theory includes all of the following except

a. all matter is made up of very small particles called atoms
*b. there are only as many physically different kinds of atoms as there are kinds of elements
c. the atoms of a given element have a definite average mass
d. the atoms of different elements have different average masses
e. compounds are formed by the union of atoms

A
8
P .19
Cor.I-.11
Cor.X.06

11. The first organic substances to be produced entirely from inorganic substances was

a. citric acid
b. urea
c. phlogiston
*d. acetic acid

A
8
P .42
Cor.I.19
Cor.X.18

12. Phlogiston

a. has a negative weight
*b. does not exist
c. has a positive weight
d. burns with oxygen

CHAPTER IV

B
8
P .34
Cor.I.50
Cor.X.30

1. The most valuable effect of Wohlers laboratory synthesis of urea was probably that of

a. making available to agriculture nitrogenous fertilizers
b. clarifying the action of the nitrogen-fixing bacteria
*c. removing the barrier between organic and inorganic matter
d. clarifying the sequence of protein digestion and excretion of nitrogenous wastes
e. enabling the development of a convenient diagnosis for sugar diabetes

B
8
P .08
Cor.I.08
Cor.X.06

2. Antoine Lavoisier, the French chemist, working on the Phlogiston Theory suggested that very careful measurements must be made before and after each experiment. In a closed container of air, a small portion of phosphorus was burned. The purpose of this test was to

a. see how long the phosphorus would burn
b. use one-fifth of the air--the oxygen
c. test the Phlogiston Theory
*d. see how much phosphorus would burn
e. determine the composition of the air

B
8
P .23
Cor.I.10
Cor.X.23

3. The mint and mouse experiment

a. was the beginning of the end of the Phlogiston Theory
*b. proved that a mouse cannot live in a closed container with a lighted candle
c. showed that the mint and the mouse used the same gas
d. was proof that oxygen was a part of free air

B
8
P .68
Cor.I.31
Cor.X.08

4. Kinetic energy is associated with motion or energy being released through oxidation. Potential energy, however, is exemplified by

a. a compressed spring
b. a loaded gun
c. a tank full of gasoline
d. a high-tension power line
*e. all of these

B
6
P .41
Cor.I.09
Cor.X.42

5. Spallanzani found that gastric juices from turkey gizzards would break down food materials. If he wanted to heat the juice to 100°C yet have a maximum amount of breakdown, he would

a. heat the juices before adding it to the food
*b. heat the juices after adding it to the food
c. heat the juices before adding, but cool rapidly
d. cool the juices before heating, then add to food

B
9
P .24

Cor.I-.21
Cor.X-.20

6. Michael Johnson wanted to remove an uprooted tree stump from his yard. Unable to budge the stump, he decided to burn it. After burning, the stump was carried away easily as ashes. Which statement best explains the ease with which the remains of the stump were removed?

a. the stump was oxidized
b. the great portion of the matter in the stump was destroyed
*c. gases and water vapor were liberated by burning, thus making the stump lighter
d. the stump was chemically reduced
e. none of these. The weight of the stump remained the same

B
8
P .32

Cor.I.29
Cor.X.10

7. In 1886, Charles Hall in Ohio, discovered the means to separate aluminum from its ore. Aluminum ore was in a carbon-lined pan. With an application of electricity, the aluminum trickled to the bottom of the pan where it later hardened. This is an example of

*a. electricity doing chemical work (electrolysis)
b. oxidation of aluminum ore
c. potential energy at work
d. transformation of one form of matter into another
e. none of these

B
8
P .86

Cor.I.04
Cor.X-.04

8. What is the importance of the Law of Conservation of Mass to the science of chemistry?

a. it provides unreliability
b. it complicates the order
c. it provides monotony
*d. it provides consistency

B
9
P .65

Cor.I.32
Cor.X.30

9. Early chemists felt that it would be impossible to learn much about organic compounds. They felt that some "vital force", or mystical power associated with life was necessary. In 1828, Friedrich Wohler made urea synthetically. This shows us that

a. chance favors a prepared mind
b. there is nothing new under the sun
c. organic compounds are easy to make
d. organic compounds are composed of carbon and oxygen
*e. none of these

10. Which of the following is interpretation rather than observation?

*a. mercuric oxide is structurally changed when exposed to heat
b. mercuric oxide undergoes a chemical change when exposed to heat
c. less mercuric oxide remains as the heating process is continued
d. none of these

CHAPTER IV

C
8
I.41

1. If a mouse was placed in a container with an oxygen producing plant in a dark room

   a. the plant would die in about a week
   b. the mouse would die after about a week (Cor.I.31)
   c. the plant wouldn't produce oxygen (Cor.X.13)
   d. none of the above would happen
   *e. a, b and c are true

D
4
P .70

Cor.I.11
Cor.X.06

1. A student proposes the hypothesis that plants are necessary for the survival of animals. Which of the following would best support his hypothesis?

   a. the observation that plants seem to be present where animals are found
   b. placing a small fish and plant in a sealed water container and observe for two weeks
   c. placing a small fish in an open water container and observe for two weeks
   *d. placing a small fish in one sealed container, and placing a plant and a fish in a second sealed water container, and observe for two weeks

D
2
P .56

Cor.I.28
Cor.X.18

2. Under the microscope a biologist sees that his material has a regular arrangement of cubical appearing structures. The biologist would probably conclude that

   a. the material is alive
   b. the material has been alive but is now dead
   c. the material has atoms large enough to see with the microscope
   d. the material has electrons moving in rectangular orbits
   *e. none of the above

CHAPTER V

A
6
P .70

Cor.I.31
Cor.X40

1. The valence electrons of the atom are the electrons found in the

a. kernel
b. nucleus
*c. incomplete outer shell
d. incomplete inner shell

A
6
P .24

Cor.I.33
Cor.X.39

2. Breaking down large molecules into simpler smaller ones is accomplished in the digestive process by a chemical reaction known as

a. dehydration synthesis
*b. hydrolysis
c. plasmolysis
d. synthesis

A
2
P .32

Cor.I.31
Cor.X.32

3. An atom is to oxygen as a molecule is to

a. nitrogen
b. compound
c. element
*d. water

A
6
P .69

Cor.I.31
Cor.X.32

4. Pure water is

a. an acid because it contains a hydrogenion
b. a base because it contains an hydroxyl radical
*c. a neutral substance because it has a pH of 7
d. an ionic compound because it completely iononizes

A
6
P .70

Cor.I.34
Cor.X.30

5. Co-valent compounds are formed by

*a. atoms such as carbon and hydrogen, sharing electrons to complete their outer electron orbits
b. atoms such as sodium and chlorine gaining or losing electrons and forming ions
c. molecules with different electrostatic charges
d. only elements which are metals

A
6
P .48

Cor.I.49
Cor.X.28

6. Ionic compounds are formed by

*a. the gain or loss of electrons of the atoms
b. the sharing of electrons of the atoms
c. the gain or loss of protons by the atoms
d. the sharing of neutrons by the atoms

A
8
P .44

Cor.I.29
Cor.X.03

7. Which element occurs in the mon-atomic state in air?

a. oxygen
b. hydrogen
*c. argon
d. nitrogen

A
7
P .66

Cor.I.36
Cor.X.32

8. The atomic weight of an atom can be found by

a. adding the electrons and protons
b. adding the electrons and neutrons
c. counting just the neutrons
d. counting the electrons and neutrons
*e. counting the protons and neutrons

A
2
P .45

Cor.I.36
Cor.X.29

9. The smallest unit of structure having all the properties associated with life is

a. atom
b. element
*c. cell
d. compound
e. matter

A
6
P .46

Cor.I.25
Cor.X.22

10. The role of the ribosomes is to

*a. assist in the bonding of amino acids into proteins
b. carry the genetic make-up of the cell
c. carry on oxydation
d. manufacture food for the cell

A
8
P .35

Cor.I.09
Cor.X.14

11. The element neon is never found in chemical compounds because

*a. it is chemically stable
b. it is a gas
c. it is an explosive
d. it is lighter than air
e. it is too active

A
8
P .46

Cor.I.20
Cor.X.18

12. Air is composed mostly of

a. nitrogen and hydrogen
b. hydrogen and oxygen
*c. nitrogen and oxygen
d. helium and oxygen
e. oxygen and water

A
6
P .43

Cor.I.50
Cor.X.25

13. An isotope of carbon differs from an ordinary carbon atom

a. by having a different number of protons in its outer orbit
b. by having a different number of electrons in its nucleus
c. by having a different atomic number
*d. by having a different number of neutrons

A
6
P .33

Cor.I.24
Cor.X.12

14. The concept of kinds of matter is best illustrated in the concept of

a. atoms
*b. elements
c. neutrons
d. cells
e. conservation of mass

A
6
P .53

Cor.I.04
Cor.X.18

15. The biologist and the chemist are both interested in the smallest unit of particle. What is the basic unit of structure for each of these scientists?

a. elements and cells
b. nucleus and protons
c. mass and protoplasm
*d. cells and atoms
e. neutrons and elements

A
6
P .28

Cor.I.27
Cor.X.37

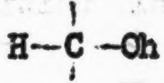
16. Which of the following statements incorrectly completes this statement? If the unit particle of all matter is the atom then

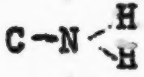
*a. every combination of two or more substances to form a mixture should involve definite proportions of the substances
b. when two elements combine in differing proportions to form two different compounds, then the proportion in one case should be a whole number multiple of the other
c. energy transformations are brought about by their interaction
d. they must vary in some way to impart individual characteristics to the elements (and compounds)

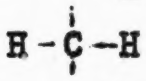
A
6
P .25

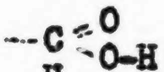
Cor.I.28
Cor.X.35

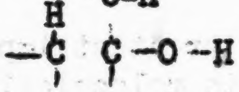
17. The grouping of atoms which confers acid properties to both fatty acids and amino acids is

a. 
$\mathrm{H-\underset{|}{\overset{|}{C}}-Oh}$

b. 
$\mathrm{C-N{<}^{H}_{H}}$

c. 
$\mathrm{H-\underset{|}{\overset{|}{C}}-H}$

*d. 
$\mathrm{-C{<}^{O}_{O-H}}$

e. 
$\mathrm{-\underset{|}{\overset{H}{C}}\;\underset{|}{\overset{|}{C}}-O-H}$

A
6
P .81

Cor.I.36
Cor.X.14

18. A compound

a. is made up of only one element
*b. is made up of elements which combined chemically
c. is composed of atoms which are all alike
d. is made up of elements which are not combined chemically
e. is the same thing as a mixture

A
6
P .56

Cor.I.10
Cor.X.31

19. An element has an atomic weight of 147. If it has an atomic number of 39, it would have _____ neutrons.

a. 147
b. 39
*c. 108
d. 186

6
P .93
Cor.I.28
Cor.X-.04

20. The best solvent known is

a. sulfuric acid (H_2SO_4)
b. hydrochloric acid (HCl)
c. ammonium hydroxide (NH_4OH)
*d. water (H_2O)

A
9
P .27
Cor.I.33
Cor.X.13

21. Amino acids are composed of

a. hydroxide and amino groups
*b. carboxyl and amino groups
c. glycerol and fatty acids
d. glycerol and amino groups

A
6
P .24
Cor.I.00
Cor.X.29

22. Chemical reaction

a. involves a transfer of neutrons
b. involves a transfer of electrons
c. involves a transfer of protons
d. involves a transfer of atoms
*e. involves a transfer of energy level

A
6
P .18
Cor.I-.01
Cor.X-.23

23. In a chemical laboratory a substance is tested and found to contain nitrogen. It is also tested and found to be separable into smaller molecules by the chemical addition of water. What might this chemical be?

a. amino acid
*b. protein
c. fat
d. sugar
e. starch

A
6
P .49
Cor.I.52
Cor.X.22

24. Which of the following is of the greatest importance in the formation and structure of protein molecules?

a. fatty acids
b. glucose
c. glycerol
*d. amino acids

A
8
P .79
Cor.I.24
Cor.X.14

25. If an atom has eight protons in the nucleus, how many electron will it have?

a. 2
b. 4
c. 6
*d. 8
e. 10

A 26. **Which of the following characteristics do all compounds have in common?**
2
P .35

a. molecular bands
Cor.I.27 *b. constant proportions
Cor.X.26 c. covalent bonds
d. relative stability

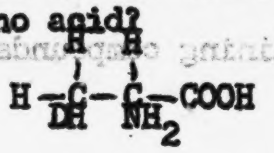
A 27. **Which is a more acid pH?**
8
P .71 *a. 1 to 4
b. 5 to 7
Cor.I.54 c. 8 to 10
Cor.X.14 d. 11 to 14

A 28. **NaCl is**
8
P .66 a. an atom
b. a molecule
Cor.I.12 *c. a compound
Cor.X.20 d. a mixture
e. an ion

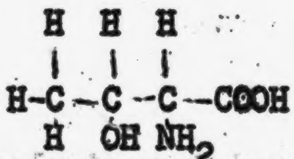
A 29. **Which of the following is a molecule with covalent bonding but is not a compound?**
8
P .57

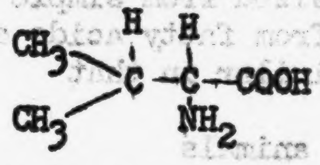
a. CH_4
Cor.I.23 b. HOH
Cor.X.15 *c. H_2
d. NaCl

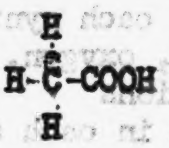
A 30. **Which of the following is not a structural formula for an amino acid?**
2
P .48

a.

$\mathrm{H-\underset{OH}{\overset{H}{C}}-\underset{NH_2}{\overset{H}{C}}-COOH}$

Cor.I.19
Cor.X.08

b.

$\mathrm{H-\underset{H}{\overset{H}{C}}-\underset{OH}{\overset{H}{C}}-\underset{NH_2}{\overset{H}{C}}-COOH}$

c.


*d.

$\mathrm{H-\underset{H}{\overset{H}{C}}-COOH}$

A
6
P .21
Cor.I.27
Cor.X.27

31. A pH change from 3 to 1 increases the hydrogen ion concentration

- *a. a one hundred fold change
- b. a ten fold change
- c. a twenty fold change
- d. a thousand fold change

A
8
P .43
Cor.I.14
Cor.X.24

32. Of the following, the atom can be seen by means of

- a. an electron microscope
- b. a compound microscope
- c. a geiger counter
- *d. no instrument now available
- e. a spectroscope

A
8
P .59
Cor.I.41
Cor.X.44

33. Four of the following are complex carbohydrates. Which one is a simple carbohydrate?

- a. starch
- *b. glucose
- c. cellulose
- d. glycogen
- e. granulated sugar

A
8
P .57
Cor.I.21
Cor.X.23

34. Fats are built around many components that later are broken down into simpler parts which are called

- a. fatty acids and carboxyl
- b. glycerol and carboxyl
- *c. fatty acids and glycerol
- d. fatty acid and hydroxyl
- e. glycerol and hydroxyl

A
8
P .21
Cor.I-.06
Cor.X.12

35. The most abundant carbon containing compounds are

- a. carbohydrates
- b. amino acids
- *c. proteins
- d. fats
- e. steroids

A
6
P .26
Cor.I.55
Cor.X.24

36. Carbohydrates can be synthesized from simple sugars, proteins from amino acids, and fats from fatty acids and glycerol. Their three reactions are similar in that

- a. all three occur only in animals
- b. a molecule of water is used in each synthesis
- c. all three use carbon, hydrogen, oxygen, and nitrogen
- d. ADP is used in all three reactions
- e. a molecule of water is removed in each synthesis

CHAPTER V

B
6
P .36
Cor.I.54
Cor.X.47

1. How many water molecules would be required to split one molecule of a typical fat into fatty acids and glycerol?

*a. 1
b. 2
c. 3
d. 4

B
8
P .32
Cor.I.55
Cor.X.34

2. A naturally-occuring inorganic substance having a definite chemical composition and, as a rule, a definite form and structure is properly called

a. an organic compound
b. coal
c. a mixture
d. a physical property
*e. a mineral

B
6
P .63
Cor.I.36
Cor.X.31

3. If an atom gains an electron it becomes an ion which is

*a. negatively charged
b. positively charged
c. not charged
d. none of these

B
6
P .57
Cor.I.30
Cor.X.18

4. If you had a very sour tasting solution and you had to use it, how would you remove the sour taste?

a. add acid
*b. add base
c. add sugar
d. add salt
e. add water

B
6
P .70
Cor.I.42
Cor.X.21

=5. A pool of water has a pH of 5.8. What would you do to make the water neutral?

a. add acid
*b. add base
c. add salt
d. add distilled water

B
2
P .43
Cor.I.02
Cor.X.08

6. When a lighted candle is introduced into a container that contains a mixture of oxygen and helium, the following reaction takes place

a. an explosion
b. helium will unite with oxygen
c. water is formed by the mixture
*d. carbon dioxide is produced

B
6
P .34

7. How has the discovery of the -inert- gases Helium, Neon and Argon with 2, 10, and 18 electrons respectively helped chemists understand the chemical reactivity of elements?

Cor.I.34
Cor.X.15

a. by noting that these elements are normally non-reactive
b. by noting that elements with 1, 6, and 17 electrons are very reactive
c. by noting that elements like oxygen, hydrogen and nitrogen react together to form diatomic molecules
*d. all of the above
e. none of these

B
6
P .43

8. In the synthesis of large molecules from amino acids select one factor of greatest significance with respect to the bonding of the smaller molecules into larger molecules. The linkage of one amino acid to another amino acid involves

Cor.I.10
Cor.X.01

a. only the amino groups of both amino acids forming the linkage
b. hydrolysis
c. only the carbon atoms in the two amino acids being joined
*d. the carboxyl group of one amino acid and the amino group of another amino acid

B
8
P .23

9. If we recognize that oxygen is a good oxidizing agent, what is there in its atomic structure that would lead you to this conclusion?

Cor.I-.11
Cor.X-.13

a. number of electrons
*b. arrangement of electrons
c. its physical state
d. relative abundance
e. it combines with water

B
8
P .27

10. Consider the following changes: (a) the grinding of wheat to flour (b) the drying of clothes (c) the drying of paint (d) the making of burned toast (e) the melting of ice. How many of these are strictly physical changes?

Cor.I.11
Cor.X-.06

a. 1
b. 2
c. 3
*d. 4
e. 5

B
8
P .39

11. Adding acid to a solution with a pH of 8.5 lowered the reading to 5.5. By adding an equal amount of a base the reading was brought up to 7.0. From this we can conclude that

Cor.I.16
Cor.X.20

a. the base was stronger than the acid
*b. the acid was stronger than the base
c. adding an equal amount of acid and base will result in a neutral reaction (solution)
d. we can reach no conclusion on the basis of evidence given
e. dilution causes no appreciable change in pH

B
8
P .43

12. Synthesis of proteins, carbohydrates, and fats involves removal of water whereas in hydrolysis water is added. Which of the following is an example of hydrolysis?

Cor.I.31
Cor.X.27

a. glucose plus glucose yields maltose plus water
b. fatty acid plus glycerol yields fat plus water
c. glycine plus alanine yields glycyl alanine plus water
*d. maltose plus water yields glucose plus glucose
e. none of these

B
7
P .24

13. Water is the most abundant compound in cells and is relatively stable. It is the best solvent known. This property is important because

Cor.I.26
Cor.X.11

*a. chemical substances become separate molecules or ions which enter chemical reactions more readily
b. water ionizes readily forming many hydrogen and oxygen ions
c. water molecules prevent diffusion
d. water molecules increase their motion as temperatures rise
e. none of these

B
8
P .36

14. In a reaction that produces salt, sodium gives up one electron to the chlorine atom. Both atoms are transformed into ions, and are attracted to each other. We know that ionization can occur by

Cor.I.26
Cor.X.10

a. balancing the equation
b. doing the experiment to produce salt
c. dissolving salt in water, then evaporate
d. dissolving salt in water, then filtering out the ions
*e. making a salt solution and checking to see if it will conduct an electrical current

B
8
P .34

15. Which of the following is not true of carbohydrates?

Cor.I-.04
Cor.X.04

a. found in living things
b. $C_{12}H_{22}O_{11}$ is a carbohydrate
*c. addition of water usually causes carbohydrate molecules to combine into larger molecules
d. fructose and galactose can combine to form a larger molecule by losing water

B
6
P .78

16. Which of the following best shows the significance of how the numbers of electrons an atom contains determine its chemical behavior?

Cor.I.32
Cor.X.09

a. unstable atoms tend to join stable compounds
b. atoms that are already stable have greater potential in joining other atoms
c. reactions which can occur without violent results
*d. unstable atoms tend to join other atoms to promote stability

B
6
P .32

17. What is the relationship between RNA and amino acids?

Cor.I.39
Cor.X.24

a. RNA aids in breaking down protein
*b. RNA directs protein synthesis
c. both are a result of protein digestion
d. none of these

B
8
P .68

18. An element has an atomic number of 90, and an atomic weight of 233. How many neutrons does its nucleus contian?

Cor.I.40
Cor.X.07

a. 90
*b. 143
c. 233
d. 323

B
2
P .78

19. Certain food such as strawberries, limes and plums have a pH that is in the vicinity of 3 to 5. This tells us that these foods are

Cor.I.30
Cor.X.33

a. alkaline
b. neutral
c. basic
*d. acid
e. sweet

CHAPTER V

C
2
P .42

Cor.I.26
Cor.X.14

1. A certain isotope of an element has an atomic number of 25 and an atomic mass (weight) of 52. Another isotope of the same element has a mass of 54. Which of the following is correct?

*a. 25 protons, 25 electrons and 29 neutrons
b. 26 protons, 26 electrons and 27 neutrons
c. 54 protons, 25 electrons, and 0 neutrons
d. 26 protons, 25 electrons and 28 neutrons

C
7
P.15

Cor.I.-.07
Cor.X-.06

2. Study the simplified reaction and check the correct statement
$NaOH + HCl = NaCl + HOH$

a. NaOh is an acid
b. Cl is a positive ion
c. the reaction requires enzyme action
*d. NaCl has a pH of 7

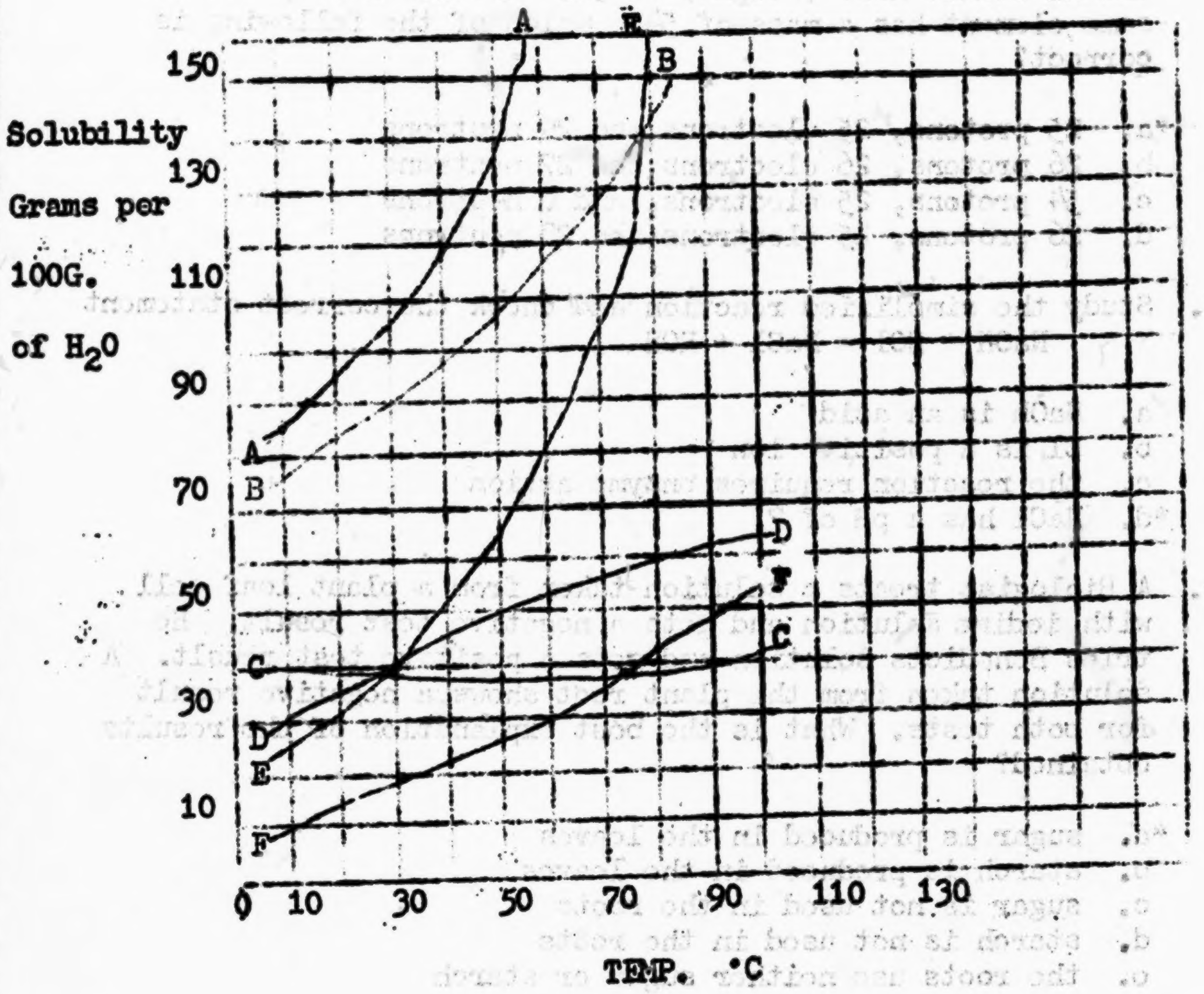
C
6
P .18

Cor.I.08
Cor.X.23

3. A Biologist treats a solution taken from a plant leaf cell with iodine solution and gets a negative test result. He tries Benedicts solution and gets a positive test reuslt. A solution taken from the plant root shows a negative result for both tests. What is the best explanation of the results obtained?

*a. sugar is produced in the leaves
b. starch is produced in the leaves
c. sugar is not used in the roots
d. starch is not used in the roots
e. the roots use neither sugar or starch

The graph below refers to the following two questions



C
9
P .79

Cor.I.31
Cor.X.40

4. The substance whose solubility changes least for the temperature range shown is

a. A
b. B
*c. C
d. D
e. E

C
9
P..48

Cor.I.06
Cor.X.19

5. The substance which is most soluble in water at 0° (degrees) Centigrade is

*a. A
b. B
c. C
d. D
e. E

CHAPTER V

D
6
P .25

Cor.I.18
Cor.X.23

1. To form the compound $CH_2 = CH_2$ the C (carbon) atom would need to have

a. a complete outer shell
b. an incomplete inner shell
*c. an incomplete outer shell of two electrons
d. an incomplete outer shell of six electrons
e. none of these

D
6
P .19

Cor.I.26
Cor.X.14

2. Energy for the organisms vital functions comes from

a. chemical reaction in which matter is changed into energy
*b. the rearrangement of chemical compounds into new chemical compounds which contain less energy
c. combining atmospheric oxygen directly with such energy compounds as starch
d. changing chemical energy into mechanical energy

D
6
P .45
M
Cor.I.46
Cor.X.29

3. The atomic weight of chlorine is 36, its atomic number is 17. Which of the following is true?

a. chlorine has 17 electrons and 36 neutrons
b. the 17 protons and 19 electrons are contained in the nucleus of the atom
c. the 19 electrons rotate in three orbits around the nucleus of the atom
* d. the chloride ion has a unit charge of negative electricity

D
6
P .70

Cor.I.19
Cor.X.04

4. What is the relationship between the atomic neutrons and protons, and the biological cell?

a. the protons, neutrons and electrons are called the atomic nucleus
b. the electrons and protons are called the atomic nucleus
c. the neutrons and electrons are known as the atomic nucleus
d. the biological nucleus is similar to the neutrons only
e. the protons and neutrons are counterparts of the biological nucleus

D
7
P .43

Cor.I.31
Cor.X.23

5. What is the relationship between proteins and amino acids?

a. amino acids are built of various combinations of some 20 sub-units called proteins
*b. proteins are built of various combinations of some 20 sub-units called amino acids
c. both are small, simple molecules
d. both are inorganic compounds
e. there is no relationship

D
7
P .83

6. The least important characteristics of distilled water in relation to science

Cor.I.33
Cor.X.13

- a. is the motion of the water molecules
- b. its great solvency power
- c. the substances dissolved in it are usually reduced to molecules and ions
- *d. it is tasteless

D
8
P .53

7. When the bell rings to dismiss us for our next period class, there has been a

Cor.I.47
Cor.X.28

- a. flow of atoms over the wires
- *b. flow of electrons over the wires
- c. flow of neutrons over the wires
- d. flow of protons over the wires
- e. flow of elements over the wires

D
6
P .51

8. When the chemical substances hydrogen and oxygen unite ($2H_2 + O \rightarrow H_2O$ + energy) this leads to

Cor.I.31
Cor.X.11

- *a. greater stability for the atoms involved
- b. less stability for the atoms involved
- c. to water a more unstable substance
- d. two new compounds formed
- e. none of these

CHAPTER VI

A
6
P .64

1. The term "differentially permeable" is used to describe which of the following parts of constituents of a typical living cell?

Cor.I .36
Cor.X .08

a. nucleus
b. cytoplasm
c. centrosome
*d. plasma membrane
e. chromatin

A
6
P .73

2. The energy for cell activities is made available by the splitting of which of the following molecules?

Cor.I .25
Cor.X .17

a. DNA
b. RNA
*c. ATP
d. ADP
e. DPN

A
6
P .35

3. Energy for the cell is provided in the

Cor.I .40
Cor.X .32

a. golgi
b. nucleus
*c. mitochondria
d. nucleolus
e. endoplasmic recticulum

A
8
P .42

4. $C_6H_{12}O_6 + 6O_2 + 38\ ADP \dashrightarrow 6CO_2 + 6H_2O = 38\ ATP$

The above equation shows

Cor.I .30
Cor.X .11

*a. the source of energy in the cell
b. the formation of de-oxyribonuleic acid
c. photosynthesis
d. the activity in the golgi

A
6
P .48

5. Of the following characteristics, which one is common to all living cells?

Cor.I .29
Cor.X .11

a. cellulose cell wall
b. nuclear material scattered throughout the cell
*c. cell membrane
d. chloroplasts
e. more than one of the above

A
6
P .40
M
Cor.I .48
Cor.X .46

6. Proteins enter cells in the form of

a. protein
*b. amino acids
c. glucose
d. maltose
e. fats

A 7. A cell membrane that allows some but not all molecules to
6 pass through is
P .66

.20 a. permeable
Cor.I.07 b. transparent
Cor.X-.01 *c. semipermeable
d. impermeable
e. translucent

A 8. Which of the following pairs are more closely related?
8
P .26 a. RNA and the nucleolus
b. RNA and the nucleus
Cor.I.17 *c. RNA and the cytoplasm
Cor.X.17 d. RNA and the cell membrane
e. RNA and chlorophyll

A 9. In animal cells which of the following is correct?
6
P .68 a. oxygen and carbon dioxide pass into cells simultaneously
b. carbon dioxide and oxygen pass out of cells simultaneously
Cor.I.40 c. oxygen and carbon dioxide pass in and out of cells simultaneously
Cor.X.25
*d. oxygen passes into the cells while carbon dioxide passes out of the cells
e. oxygen and carbon dioxide do not pass in or out of cells

A 10. Each cell of a living organism contains how many enzymes?
6
P .25 a. 4
b. over 100
Cor.I.16 c. under 1,000
Cor.X-.11 *d. over 2,000

A 11. An enzyme is
6
P .60 *a. a catalyst
b. a digestive juice
Cor.I.23 c. a hormone
Cor.X.36 d. an acid
e. a complex protein

A 12. The tiny granules inside the endoplasmic reticulum are
6
P .58 a. mitochondria
b. lysosomes
Cor.I.35 c. centrosomes
Cor.X.05 *d. ribosomes

A
6
P .41
Cor.I.48
Cor.X.33

13. ATP is stored in the

*a. mitochondria
b. ribosomes
c. golgi bodies
d. endoplasmic reticulum

A
6
P .24
Cor.I.25
Cor.X.28

14. Which of the following is not a correct relationship between reactions in cells and the energy a cell uses?

*a. the cell uses mostly heat energy
b. the oxidation of glucose is the principle energy source
c. the cell uses mostly chemical-bond energy
d. most of the energy is stored in a compound called adenosine triphosphate

A
7
P .27
Cor.I.24
Cor.X.15

15. During exercise

a. ATP breaks down into ADP
b. ADP resynthesizes ATP
c. energy is released
*d. all of the above occur
e. two of the above occur

A
7
P .05
Cor.I.14
Cor.X-.04

16. If food is scarce, an organism will

a. synthesize protein
*b. hydrolize protein
c. oxidize fat directly
d. oxidize enzymes

A
6
P .48
Cor.I.47
Cor.X.43

17. Energy for the cell is provided in the

a. golgi
b. nucleus
*c. mitochondria
d. nucleolus

A
6
P .89
Cor.I.41
Cor.X.33

18. Which of the following forms the boundary of an animal cell?

a. nucleus
b. centriole
c. mitochondria
*d. plasma membrane

A
6
P .56
Cor.I.14
Cor.X.26

19. Which of the following is not true of enzymes?

a. they are organic catalysts
b. they are proteins
c. they combine with a substrate
*d. they are nonspecific
e. they speed up chemical reactions

A
6
P .28
Cor.I.43
Cor.X.38

20. In cellular oxidation of glucose a single molecule of glucose provides enough chemical energy for the synthesis of

a. 2 molecules of ATP
b. 30 molecules of CO_2
*c. 38 molecules of ATP
d. 2 molecules of ADP

A
6
P .64
Cor.I.51
Cor.X.36

21. Assume that a cytological technique had been perfected whereby the mitochondria could be removed from a cell without disrupting the structure of the remaining cell constituents. Which of the following biochemical and physiological factors would be most directly affected by removal of the mitochondria?

a. water regulation of the cell
b. DNA synthesis in the cell
c. reproductive ability of the cell
*d. energy metabolism of the cell

A
3
P .57
Cor.I.16
Cor.X.06

22. The cell structure most related to genetic continuity is the

a. endoplasmic reticulum
b. cytoplasm
*c. nucleus
d. golgi bodies

A
7
P .48
Cor.I.31
Cor.X.22

23. The function of enzymes in the cell is to

*a. increase the rate of chemical reaction within the cell
b. produce energy-releasing substances
c. produce proteins
d. produce glucose

A
7
P .73
Cor.I.30
Cor.X.29

24. The functions of the cell membrane is to

a. produce RNA
*b. exert differential control over what enters and leaves the cell
c. hold cell together
d. manufacture of the ribosomes

A
7
P .26
Cor.I.33
Cor.X.11

25. When proteins are used for energy they are

*a. converted to pyruric acid
b. hydrolized
c. converted to fatty acids
d. synthesized into sugars

A
7
P .43
Cor.I.30
Cor.X.27

26. Which of the following statements could apply to the special class of proteins, the enzymes?

a. most enzymes in a cell can control more than one chemical reaction
b. enzymes give direction to the chemical activities of living cells
c. in a cell, enzymes may or may not be protein in nature
*d. enzymes enable chemical reactions in a cell to occur gently through a series of reactions but with a tremendous release of energy

A
7
P .63
Cor.I.01
Cor.X.03

27. Which of the following chemical formulas represents glucose?

a. $C_{12}H_{22}O_{11}$
b. $C_{24}H_{44}O_{22}$
c. $C_5H_{12}O_6$
*d. $C_6H_{12}O_6$

A
7
P .47
Cor.I.01
Cor.X.03

28. The structure in the cell that controls the metabolism of the cell is

a. endoplasmic reticulum
b. mitochondria
c. golgi bodies
*d. nucleus

A
7
P .78
Cor.I.29
Cor.X.23

29. Which of the following is a protein and gives direction to the chemical activities of living cells?

*a. enzyme
b. catalyst
c. carbon dioxide
d. water
e. golgi bodies

A
6
P .56
Cor.I.50
Cor.X.42

30. When energy is required for any cell process it is obtained from

*a. ATP
b. ADP
c. RNA
d. spindles
e. carbon dioxide

A
7
P .68
Cor.I.50
Cor.X.12

31. When you eat a bowl of cornflakes the energy that you get from it has ultimately come from

*a. the sun
b. the nitrogen in the soil
c. the fertilizer
d. the water
e. none of these

A
6
P .45
Cor.I.27
Cor.X.39

32. The cell membrane plays a critical role in all cell functions and directly or indirectly every cell function necessitates

*a. absorption of molecules from the exterior and/or excretion of molecules from the interior
b. absorption of molecules from the exterior
c. excretion of molecules from the interior
d. a non-selective movement of molecules across the membrane
e. none of these

A
6
P .12
Cor.I.17
Cor.X.14

33. In general, very large molecules such as those of proteins and fats cannot pass in or out of a cell and substances such as water and oxygen pass easily, this is because the cell membrane

*a. is an active, highly selective membrane
b. only absorbs molecules
c. allows only the dissolved to pass
d. is very thin
e. none of these

A
7
P .70
Cor.I.28
Cor.X.21

34. To which group of organic materials would you classify enzymes?

*a. proteins
b. carbohydrates
c. fatty acids
d. starch
e. creatine

A
6
P .68
Cor.I.22
Cor.X.11

35. The discussion of endoplasmic reticulum in chapter six points out that

a. structure always directly implies function
b. the function of endoplasmic reticulum is now understood
*c. structure alone does not necessarily explain function
d. it is concerned with cell division

A
8
P .55
Cor.I.24
Cor.X.27

36. Enzymes do not

a. cause molecules to be broken apart
b. speed up reactions
c. cause molecules to be combined
*d. become a part of new products formed

A
7
P .65
Cor.I.23
Cor.X.18

37. Enzymes are

a. general in action
b. like fats in composition
*c. faster acting where more substrate is present
d. not affected by changes in temperature

A
4
P .43
Cor.I.35
Cor.X.12

38. Most enzymes cease to function

*a. at temperatures above 60°C
b. outside of a living cell
c. if there is more substrate than enzyme
d. if there is more enzyme than substrate

A
8
P .56
Cor.I.25
Cor.X.36

39. A perfume bottle left open in a corner of a room may later be detected in another corner. The best explanation for this is

a. perfume is heavier than air and will flow across the room
b. warm air rises, so convection currents are set up
c. Brownian movement transports molecules from a region of lesser to a region of greater concentration
*d. the reverse of (c)

A
6
P .65
Cor.I.30
Cor.X.24

40. A scientist has a hypothesis that a particular enzyme performs most efficiently in an acid environment. He found through controlled experiments that it worked most efficiently at a pH of 2.2. The enzyme most likely could have been isolated from the

*a. stomach
b. small intestine
c. mouth
d. esophagus

A
8
P .39
Cor.I.23
Cor.X.25

41. If cell structures are separated by a centrifuge, which of the following would most likely be found in the top layer formed in the tube?

a. mitochondria
b. unbroken cells
c. nuclei
*d. ribosomes

A
7
P .45

42. The ability of a cell to control the amount of water it contains is an example of

a. vitalism
Cor.I.30 b. oxidation
Cor.X.18 c. abiogenesis
*d. homeostasis

A
6
P .57

43. Differentially permeable is a term used to describe

a. the nucleus
b. the cytoplasm
Cor.I.52 c. the centrosome
Cor.X.53 *d. plasma membrane
e. the chromatin

A
6
P .39

44. The synthesis of proteins, carbohydrates and fats from smaller organic units involves

a. addition of water
Cor.I.22 *b. removal of water
Cor.X.18 c. addition of oxygen only
d. removal of oxygen only
e. none of these

A
6
P .58

45. Enzymes have the following affect upon chemical reactions within cells

*a. they increase the rate of chemical reactions
Cor.I.32 b. they decrease the rate of chemical reactions
Cor.X.24 c. they do not change the rate of chemical reactions
d. none of these

A
6
P .32

46. One of the following is not true of DNA

a. it controls activities in both the nucleus and cytoplasm of cells
Cor.I-.02 *b. it controls only certain activities limited to the nucleus
Cor.X-.08 c. it controls the synthesis of specific types of RNA
d. it is the vital material that is important in inheritance

A
6
P .73

47. Enzymes

a. increase the rates of chemical reactions in cells
b. without them, no cell could live
Cor.I.46 c. are proteins
Cor.X.05 d. work in vivo
*e. all of the above

A 48. One reason that diffusion processes will not work for proteins
3 crossing the cell membrane is due to their
P .42
a. shape
Cor.I-.14 b. chemical nature
Cor.X-.17 c. size
*d. all of these
e. none of these

A 49. Enzymes are made of
6
P .34 *a. amino acids
b. glucose
Cor.I.47 c. fatty acids
Cor.X.43 d. glycerol

A 50. Which of the following molecules can be utilized for energy?
8
P .59 a. amino acids
b. glucose
Cor.I.17 c. fatty acids
Cor.X.24 *d. all of these
e. none of these

A 51. The role of the ribosomes is to
6
P .45 a. manufacture food for the cell
b. carry on oxidation
Cor.I.21 c. carry the genetic make-up of the cell
Cor.X.05 *d. assist in the synthesis of amino acids into proteins

A 52. A scientist who studies the chemistry of living systems is
8 concerned with
P .59
a. psychology
Cor.I.05 *b. physiology
Cor.X.10 c. herpetology
d. anatomy
e. morphology

A 53. Dehydration and hydrolysis can be differentiated in which
6 one of the following ways?
P .14
a. the former is the addition of water to a substance and
Cor.I.04 the latter is the removal
Cor.X.12 b. the former removes a greater amount of oxygen from the
compound than does the latter
*c. the compound being hydrolyzed increases in hydrogen
d. both have to do with the removal of water from a substance,
and their difference concerns only the effect they have
on the substance that they are added to

B 1. What is the significance of the fact that polypeptides are
6 found both inside and outside the cell?
P .14

a. proteins are soluble
Cor.I-.28 b. the cell membrane is permeable to polypeptides
Cor.X-.00 c. polypeptide synthesis occurs inside and outside of cells
*d. there are canals from the interior of the cell to the
outside

B 2. A fresh water plant is put into a saturated salt solution.
7 The cells of the plant would
P .33

a. take in more fluid
Cor.I.19 *b. loose fluid
Cor.X.31 c. show no effect
d. take in salt

B 3. A cell membrane and a semi-permeable parchment tube have in
6 common the ability to
P .45

a. allow molecules of a gas to pass through
Cor.I.16 b. be selective
Cor.X0.03 c. allow molecules of a solid to pass through
d. create levels of concentration
*e. all of these

B 4. Your text implies that nearly all cells have nuclei. Yet,
9 as you look at prepared slides in the laboratory, many of
P .46 the cells you see have no nuclei. The reason for this is

Cor.I.17 a. some of the cells actually have no nucleus
Cor.X.18 b. the section of the cell in the slide was not the section
with the nucleus
c. it was not stained with the proper stain to bring out
the nucleus
*d. all of the above

B 5. What would happen if only green light should reach the earth?
9
P .57 a. the number of animals in the world would increase
b. the amount of oxygen in the atmosphere would increase
Cor.I.38 *c. the amount of energy food supply would decrease
Cor.X.35 d. the amount of Carbon Dioxide in the atomsphere would
decrease

B 6. What would be the primary effect of removing all of the
9 mitochondria from a cell?
P .40

*a. energy metabolism of the cell would be sahrply reduced
Cor.I.23 b. regulation of diffusion in the cell would be lost
Cor.X.11 c. reproductive ability of the cell would be lost
d. RNA in the cell would be destroyed

B
7
P .48
Cor.I.22
Cor.X.28

7. Digestion of starch takes place in the mouth and in the small intestine but not in the stomach. The mouth has a pH of 7, the stomach has a pH of 2, the small intestine has a pH of 8. From this data you could conclude that

*a. digestion of starch takes place primarily in a basic solution
b. digestion of starch takes place primarily in a acid solution
c. digestive enzymes for starch are absent in the stomach
d. the starch substrate is absent in the stomach

B
6
P .03
Cor.I.09
Cor.X-.07

8. Which of the following represents the smallest group of substances that includes both the material from which the plant cell wall is made and simple sugar?

a. organic substance
b. cellulose
c. starch
*d. double sugar
e. carbohydrate

B
3
P .09
Cor.I.26
Cor.X.04

9. A group of like cells were centrifuged to fractionate them into their component parts. An analysis of one of the bottom layers revealed a high concentration of DNA. The structure which would most likely make up the bulk of this material would be

*a. chromatin
b. golgi bodies
c. endoplasmic reticulum
d. ribosomes

B
7
P .25
Cor.I-.02
Cor.X-.16

10. The probable cause of an organ in the body of an animal to cease producing a specific enzyme is

a. change in the number of chromosomes
*b. change in the DNA molecule
c. lack of glucose
d. lack of specific foods

B
6
P .34
Cor.I.13
Cor.X-.08

11. If a certain structure usually observed in a cell cannot be seen with a high power microscope

*a. it probably has not been stained properly for seeing this structure
b. it is probably absent from that cell
c. the cell is dead
d. the cell is living and the structure has moved
e. none of these

B
7
P .43
Cor.I.39
Cor.X.39

12. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + energy
   a. the glucose molecule has kinetic energy
   b. there are more hydrogen atoms on the left side of the equation
   c. the oxygen molecule is composed of 6 atoms
   *d. energy is released in this reaction

B
6
P .32
Cor.I.38
Cor.X.33

13. $C_6H_{12}O_6 + 6H_2O \quad 6CO_2 + 24H$
   a. $C_6H_{12}O_6$ represents a molecule of starch
   b. the CO_2 molecule will provide energy for oxidation
   *c. the H atom will provide energy to convert ADP to ATP
   d. the H atom should combine with the molecule of CO_2 to form H_2O

B
6
P .41
Cor.I.07
Cor.X.10

14. If you saw grains of various metals taken into a cell by pinocytosis, you could say
   a. metal is necessary for life
   b. metal can be dissolved in protoplasm
   *c. some metals are ingested by some cells
   d. none of the above

B
6
P .32
Cor.I-.19
Cor.X-.21

15. If you took a green plant, placed it in a closed container and measured the amount of carbon dioxide and oxygen present, placed it in the dark for eight hours and again measured the amount of carbon dioxide and oxygen present at the end of this period, you could expect to find
   a. no change
   b. increased amount of oxygen, decreased amount of carbon dioxide
   c. increased amount of oxygen and carbon dioxide
   *d. increased amount of carbon dioxide, decreased amount of oxygen

B
6
P .22
Cor.I.17
Cor.X-.16

16. The process affecting the above results would be
   a. photosynthesis
   *b. respiration
   c. circulation
   d. absorption

B
4
P .50
Cor.I.58
Cor.X.45

17. Human enzymes would probably function best at a temperature of
   a. 15 degrees C
   *b. 35 degrees C
   c. 60 degrees C
   d. 75 degrees C

CHAPTER IVI

B
7
P .44

18. If you could analyze the amount of enzyme and structure of the enzyme before and after it has been involved in a reaction you would find that

Cor.I.58
Cor.X.33

a. the enzyme had been altered chemically
b. the amount of enzyme would decrease
c. the amount of enzyme would increase
*d. the amount and structure of the enzyme would be about the same

B
4
P .31

19. What one group of words tells best why life on earth is possible?

Cor.I.08
Cor.X-.02

a. plants - man
b. plants - water
*c. sun - plants
d. sun - H_2O
e. sun - man

B
6
P .47
Cor.I.10
Cor.X-.06

20. Recall that the amount of enzyme and substrate present will cause the reaction rate to change (the more present, the faster the reaction). What might be the outcome if the end product of an enzyme reaction was also a catalyst?

a. constant reaction rate
b. slower reaction rate
*c. faster reaction rate
d. decreasing reaction rate
e. none of the above

B
6
P .16

21. Energy for an organism's vital functions comes from

Cor.I.33
Cor.X.27

a. chemical reactions in which matter is changed into energy
*b. the rearrangement of chemical compounds into new chemical compounds which contain less energy
c. combining atmospheric oxygen directly with such energy compounds as starch and sugar
d. changing chemical energy into mechanical energy

B
6
P .41

22. The correct relationship between mitochondria and cell energy is the following

Cor.I.33
Cor.X.27

a. their enzymes, ADP, and cytochromes transfer the energy of the food molecule to A and P
b. their enzymes, DPN, and riboflavin system transfer the energy of the food molecules to A and P
c. their enzymes, DPN and cytochromes transfer the energy of the food molecules to A and P
*d. their enzymes, DPN, and cytochromes transfer the energy of the food molecules to ADP

B
7
P .27

23. Fresh slices of raw potato are placed in beakers A and B. Beaker A contains pure water. Beaker B contains salty water (solution of 10 gm NaCl in 100 ml H_2O)

Cor.I-.17
Cor.X.00

After 30 minutes in water, how would you expect the appearance of the potato slices to differ?

a. potato A the same, potato B enlarged
b. potato A enlarged, potato B the same
*c. potato A enlarged, potato B shrunken
d. potato A shrunken, potato B the same

B
6
P .76
Cor.I.37
Cor.X.23

24. Three letters of the alphabet, a, t, and e, can be used in different sequences to form three different words, eat, ate, and tea, all with totally different meanings. With this in mind, one can explain the great diversity of organic molecules or substances in which of the following ways?

a. as with the above words and their parts, there are only three basic elements used in organic compounds
*b. different arrangements of the same elements can produce totally different compounds
c. different arrangements are not as important as is the number of each of the elements present
d. by using just three elements, an equal number of different compounds can be formed

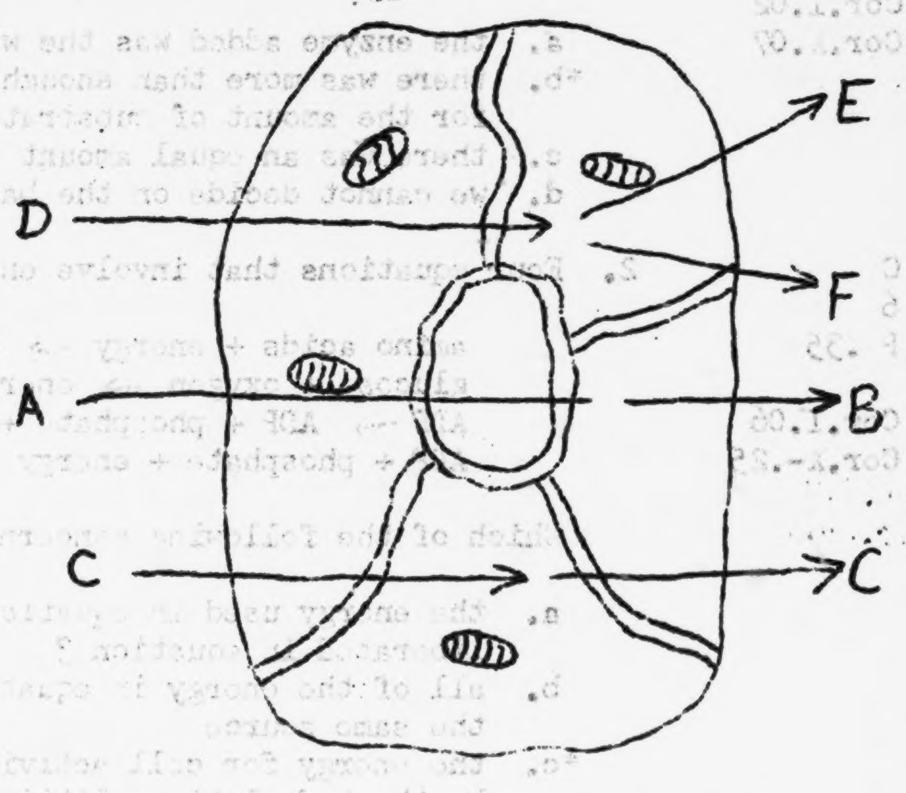
B
6
P .11
Cor.I-.08
Cor.X-.08

25. Human blood cells, normally containing .09 per cent salt mineral, were placed in a 5 per cent salt solution. Upon observing these under the microscope a few minutes later one would expect to find

a. no change had occurred
b. the cells had increased in size and some had burst
*c. the cells had decreased in size
d. cell division had occurred

B
6
P .05
Cor.I-.22
Cor.X-.02

26. The following is a hypothetical drawing of a typical animal cell. Study the drawing and answer the following question. If the letters leaving the cell are different than the ones entering, a chemical change has taken place.



You would not predict that

*a. B is oxygen
b. C is water
c. A is oxygen
d. D is glucose

CHAPTER VI

C
6
P .32

Cor.I.02
Cor.X.07

1. In a chemical reaction, adding or increasing the amount of enzyme did not alter the speed of reaction. However, after adding both enzyme and substrate, the reaction went twice as fast, we might therefore conclude

 a. the enzyme added was the wrong kind
 *b. there was more than enough enzyme present originally for the amount of substrate
 c. there was an equal amount of enzyme and substrate present
 d. we cannot decide on the basis of the information given

C
6
P .35

Cor.I.06
Cor.X-.25

2. Four equations that involve energy are stated

amino acids + energy → protein + water
glucose + oxygen → energy + carbon dioxide + water
ATP → ADP + phosphate + energy
ADP + phosphate + energy → ATP

Which of the following concerning these equations is false?

 a. the energy used in equation 4 is equal to the amount liberated in equation 3
 b. all of the energy in equations 1-4 came originally from the same source
 *c. the energy for cell activities is usually made available by the hydrolytic splitting of the ADP molecule
 d. the number of atoms in a molecule of ATP is equal to the number in a molecule of ADP plus a molecule of phosphate
 e. $C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O$ + energy

C
4
P .45

Cor.I.13
Cor.X.03

3. Viruses have no mitochondria and are all parasites. How might this be explained?

 a. some other structure in the virus provides the energy
 b. the virus does not need any energy since it is a parasite
 *c. since the virus is inside the host cell, it uses the cells' mitochondria
 d. all of the above
 e. none of the above are correct

C
9
P .57

Cor.I.26
Cor.X-.08

4. In a recent study of memory in planaria it was found that when the remains of a trained worm were fed to an untrained worm, the second worm became easier to train. But, if the trained worm's remains were first treated with an enzyme which destroyed RNA, the second worm received no advantage. From this we can assume that

 a. memory can be passed from the eater to the eaten
 *b. RNA is somehow involved with memory
 c. training can be passed from the eaten to the eater
 d. RNA is not changed completely in digestion
 e. none of the above is correct

C
6
P .50
Cor.I.36
Cor.X.38

5. The concentration of CO_2 is high inside a cell and the concentration of O_2 is low inside the cell. What kind of conditions would have to prevail in order to get the concentration of CO_2 down and the concentration of O_2 in the cell up?

*a. the concentration of CO_2 surrounding the cell would have to be low and the concentration of O_2 high
b. the concentration of CO_2 surrounding the cell would have to be high and the concentration of O_2 low
c. the concentration of CO_2 surrounding the cell would have to be high and the concentration of O_2 would have to be high
d. the osmotic pressure should be equal

C
6
P .33
Cor.I-.04
Cor.X.14

6. The process affecting the above results would be

a. photosynthesis
b. circulation
*c. respiration
d. absorption

C
6
P .65
Cor.I.34
Cor.X.22

7. A scientist has a hypothesis that a particular enzyme performs most efficiently in an acid environment. He found through controlled experiments that it worked most efficiently at a pH of 2.2. The enzyme most likely would have been isolated from the

*a. stomach
b. small intestine
c. mouth
d. blood

C
6
P .32
Cor.I.30
Cor.X.41

8. If enzyme A and enzyme B change carbohydrates to simple sugars, then

a. they would also change proteins to amino acids
b. the simple sugar will contain these enzymes
c. the pH was very alkaline
*d. none of the above

In the laboratory, a student put 5 ml. of starch solution and 1 ml of saliva in each of six test tubes. The test tubes were then each placed in a constant temperature bath at a different temperature. At intervals of thirty seconds, one drop from each tube was tested for starch until no more starch was detected. The following results were obtained. (Note the exception in tube 6)

TEST TUBE NO:	TEMPERATURE(Centrigrade)	TIME(Seconds)
1	10°	240 sec.
2	20°	120
3	30°	90
4	40°	30
5	50°	210
6	60°	300 (starch still present)

C
9
P .34

9. Which one of the following best describes the one hypothesis being tested in the above experiment?

Cor.I-.17
Cor.X-.09

a. starch can be hydrolyzed to maltose by the action of enzyme in saliva
b. for every 10° C. rise in temperature, the speed (not time) of reaction is doubled
*c. the optimum temperature at which slaivary enzyme (amylase) catalyzes the breadkown of starch molecules
d. whether the action of enzymes are destroyed by heat or cold
e. the influence of time upon the hydrolysis of starch by salivary enzyme

C
9
P .57

10. Which of the following is true of test tube 6?

Cor.I.46
Cor.X.54

a. after the original treatment, if it were cooled to 40°C. and then tested as above, the rate would be that of test tube 4
b. this is the control of the experiment
c. the testing for the presence of starch in the mixture was not carried on long enough for the reaction to become completed
*d. the reaction is taking place exceedingly slow, if at all, due to enzyme destruction

C
9
P .44

Cor.I.52
Cor.X.33

11. Which one of the following experiments would prove to be the best in determining what class of foods, carbohydrates, fats, or proteins, promotes faster growth?

a. feed three different rats a different one of the above for one week and keep an accurate record of the weights of the latter
b. take one litter of rats, feed them one of the above for one week, another for the second week, and the last one for the third week, and keep an accurate record of the weights
*c. feed each of three litters one of the above foods for a period of two weeks, and keep an accurate record of the weights
d. use more than one of the food types in each experiment with each group of rats to get better results in a shorter time

C
6
P .58

Cor.I.06
Cor.X.17

12. Assume that you are a biochemist. You have been studying the biochemical reactions in a single-celled green algae named Chlorella. Your interest has recently turned to the process of photosynthesis. You know the importance of isolating enzymes and observing their action outside of living systems. You also know that certain techniques can be used to separate cellular components. In addition, you know that the chlorophyll in green plants is contained in cellular structures called chlorplasts and these are the site of photosynthesis.

You have an idea that if you could only isolate the chloroplasts, from the Chlorella by a technique that preserved in the isolated particles the ability to carry out the complete process of green plant photosynthesis, then you could study how photosynthesis occurs in intact Chlorella cells. Of the following, which would be an assumption you would be making?

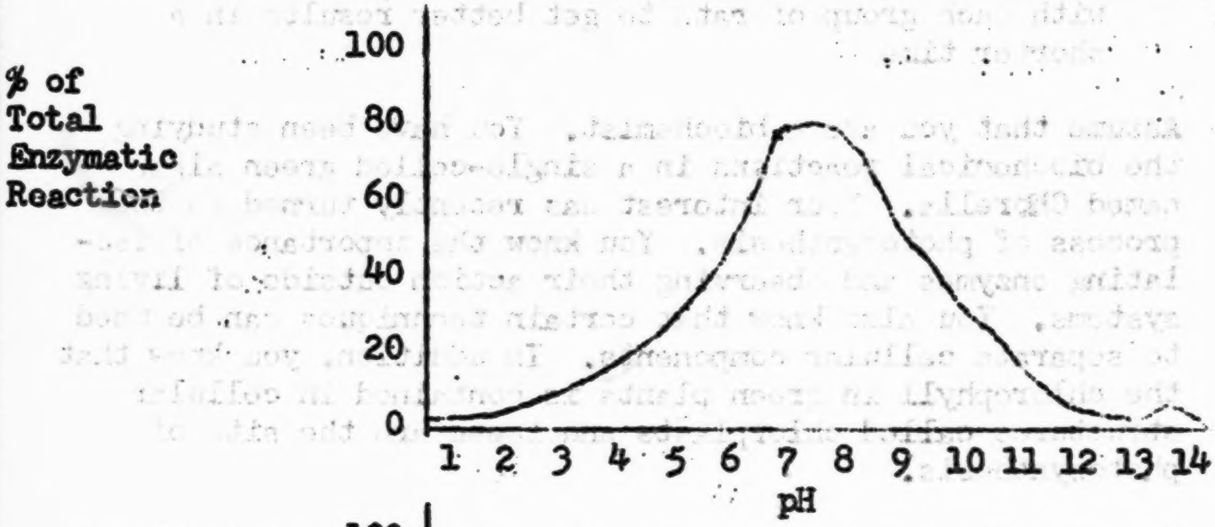
a. that green plants synthesize food
b. that reactions involving enzymes occur only outside living cells
*c. that isolated chloroplasts perform in exactly the same manner when they are inside living cells as when they are outside living cells
d. chloroplasts are highly organized cellular structures

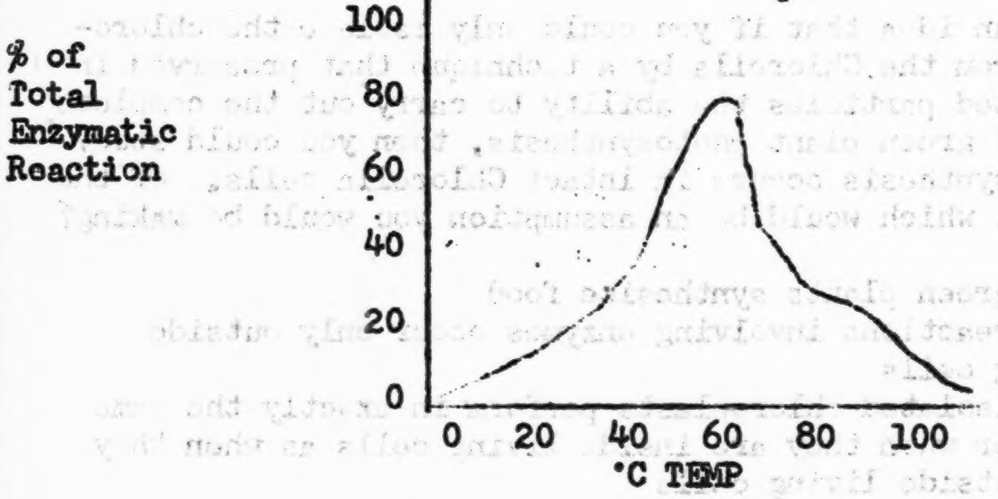
C
6
P .25
[illegible]
Cor.I.22
Cor.X-.00

13. A green plant was placed in a closed container. The amount of carbon dioxide and oxygen were determined before adding the plant. The container was placed in the dark for 24 hours with the green plant in it. After this time the amount of carbon dioxide and oxygen were once again measured. The expected finding would be

a. no change
b. increased amount of oxygen, decreased amount of carbon dioxide
c. increased amount of oxygen and carbon dioxide
*d. increased amount of carbon dioxide, decreased amount of oxygen

Study the two graphs to answer the following question



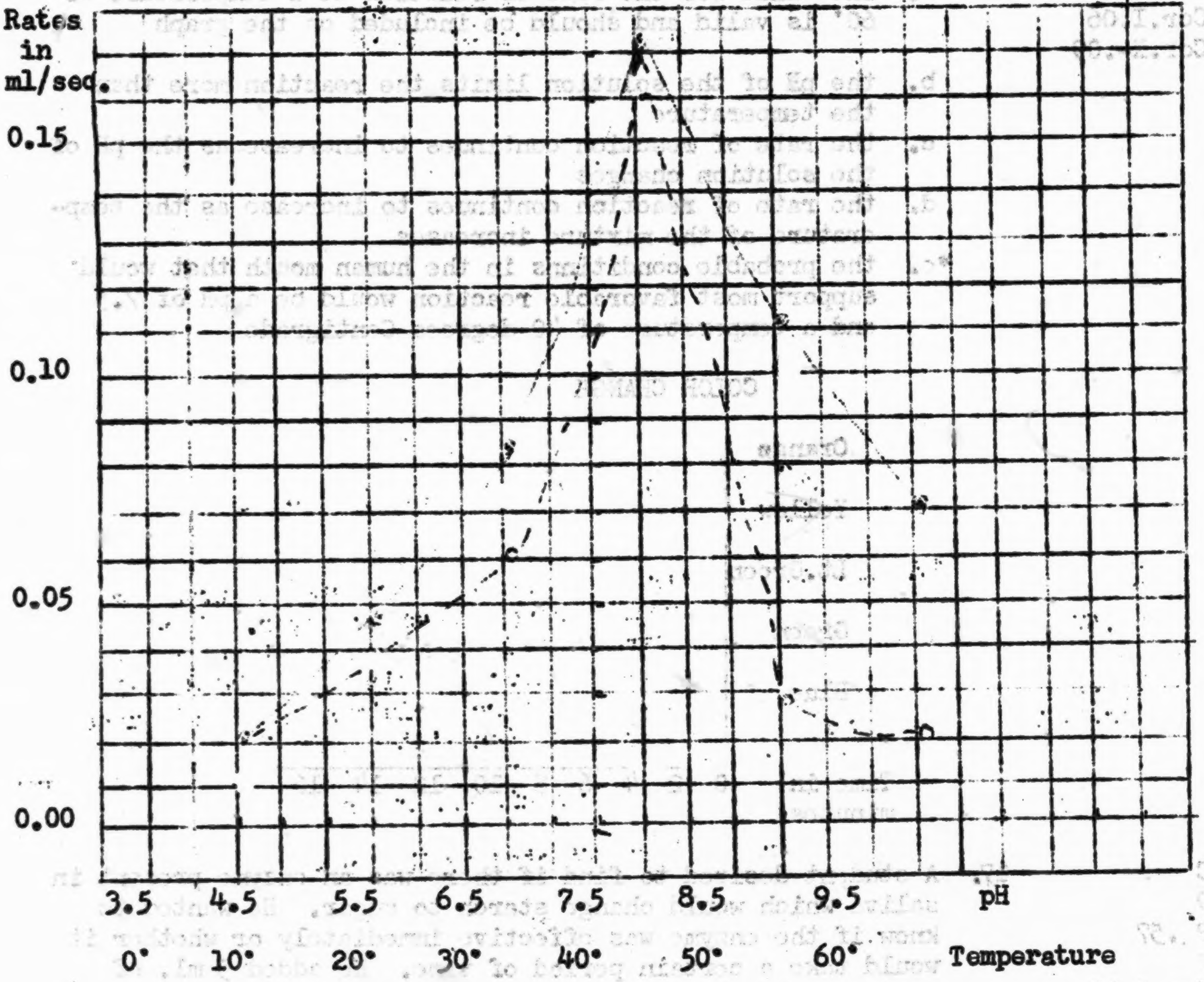


C
6
P .46
[illegible]
Cor.I.14
Cor.X.03

14. The enzyme reaction shown is most effective at

a. a pH of 1-6 and a temp. of 0° to 20° C.
*b. a pH of 6-8 and a temp. of 40° to 60° C.
c. a pH of 7 and a temp. of 100° C.
d. a pH of 8-14 and a temp. of 0° C.
e. a pH of 6-8 and a temp. of 50° C.

THE AFFECT OF DIFFERENT pH BUFFER SOLUTIONS ON THE RATE OF REACTION OF AMYLASE



C
9
P .19
23.[illegible]
Cor.I.06
Cor.X.17

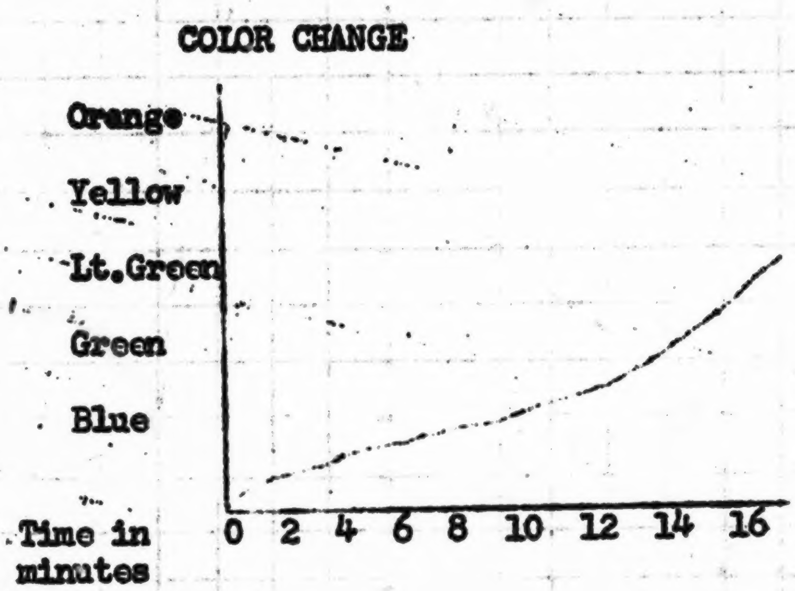
15. In determining the rate of reaction in the above, you make the assumption that

*a. the reaction takes place at a uniform rate
b. the reaction is affected uniformly for each ten degrees rise in temperature
c. the concentration of starch and saliva have no bearing on the reaction
d. the reaction is not influenced by slight fluctuations in temperatures

C
9
P .27
23.[illegible]
Cor.I.06
Cor.X-.09

16. On the basis of this experiment's data as shown on the preceeding graph, which of the following statements are true?

a. The value for the rate of reaction at a temperature of 60° is valid and should be included on the graph
b. the pH of the solution limits the reaction more than the temperature
c. the rate of reaction continues to increase as the pH of the solution changes
d. the rate of reaction continues to increase as the temperature of the mixture increases
*e. the probable conditinns in the human mouth that would support most favorable reaction would be a pH of 7.5 and a temperature of 40 degrees Centigrade

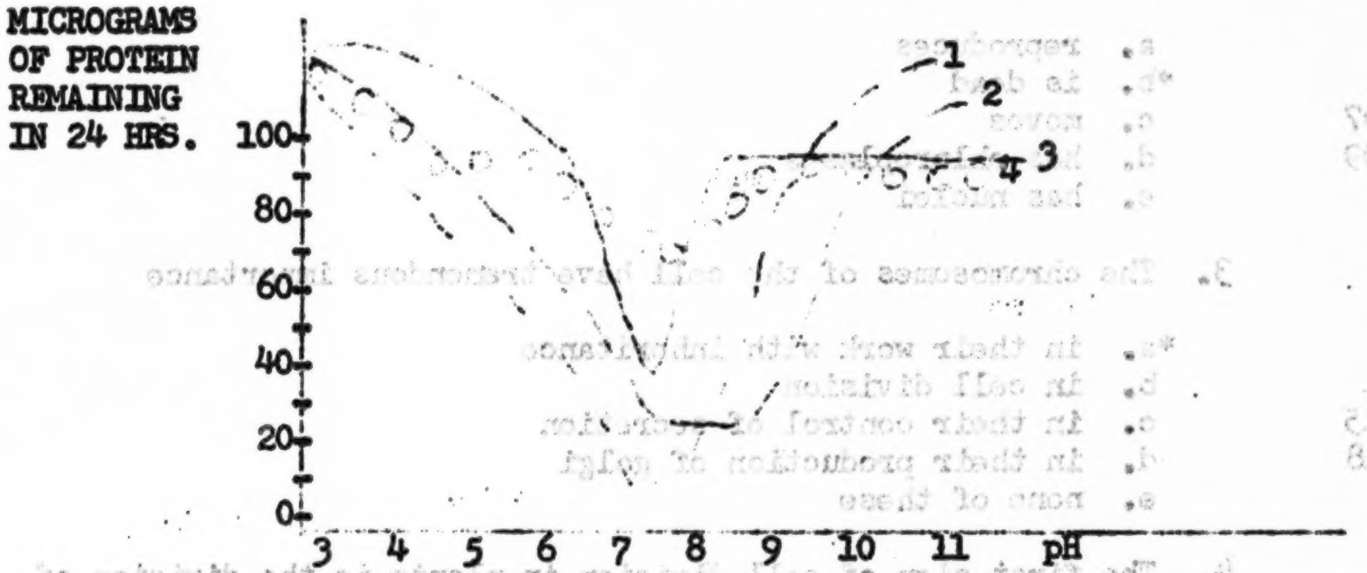


C
9
P .57
[illegible]
Cor.I.17
Cor.X.07

17. A student desired to find if there was an enzyme present in saliva which would change starch to sugar. He wanted to know if the enzyme was effective immediately or whether it would take a certain period of time. He added 5 ml. of saliva to 15 ml. of a starch solution in 5 test tubes. Every 5 minutes he used Benedicts' solution to note the presence of sugar. The results are plotted on the above graph. He could conclude from his experiment that

a. starch is not affected by the enzyme
*b. time is a factor
c. time is not a factor
d. no conclusions can be made

A scientist had a hypothesis that the pH of the enzyme environment would affect its activity. He tested his hypothesis by using four different proteins and their specific enzymes under the same controlled conditions. He placed equal amounts of each protein in tubes adjusted to the pH he was interested in testing along with proper amounts of enzyme. In 24 hours, he tested chemically for the amount of proteins left. His results are plotted below.



C
9
P .10
Cor.I-.25
Cor.X-.06

18. From the graph you can assume that

a. certain enzymes digest proteins best at a pH of 6
*b. as a rule proteins were digested best at a pH of 6.5 to 7.5
c. certain enzymes digest proteins best at pH of 6.5
d. no conclusion could be made from the information given
e. all of these answers are acceptable

C
9
P .15
Cor.I.04
Cor.X-.03

19. The protein that was most tolerant of pH variation was

*a. protein 1
b. protein 2
c. protein 3
d. protein 4

C
9
P .24
Cor.I.06
Cor.X-.06

20. The protein that was least tolerant of pH variation was

a. protein 1
b. protein 2
c. protein 3
*d. protein 4

CHAPTER VII

A
8
P .90
Cor.I.33
Cor.X.24

1. Cells of the human body contain

a. 26 chromosomes
b. 48 chromosomes
*c. 46 chromosomes
d. 32 chromosomes
e. 92 chromosomes

A
8
P .28
Cor.I.07
Cor.X.09

2. A static cell is one that

a. reproduces
*b. is dead
c. moves
d. has chloroplasts
e. has nuclei

A
6
P .40
Cor.I.25
Cor.X.18

3. The chromosomes of the cell have tremendous importance

*a. in their work with inheritance
b. in cell division
c. in their control of secretion
d. in their production of golgi
e. none of these

A
6
P .42
Cor.I.35
Cor.X.12

4. The first sign of cell division in plants is the division of the centrioles

a. the statement is true
b. the statement is partially true
c. the statement is false, the division is preceded by migration of the asters
*d. the statement is false, as plants don't have centrioles
e. the statement is false, as the centrioles in plants don't divide

A
3
P .35
Cor.I.24
Cor.X.30

5. Corn cells have 20 chromosomes, the diploid number in corn cells is

a. 10
*b. 20
c. 4
d. 40

A
3
P .62
Cor.I.35
Cor.X.28

6. Growth of an organism is accomplished by (cell division) mitosis. The most important single factor is

a. splitting of the chromosomes
b. appearance of the centromere
c. division of the cytoplasm
*d. replication of the chromosomes

A 7. When mitosis has ended, the number of chromosomes
3
P .78 *a. in a daughter cell is equal to the number in the mother cell
Cor.I.39 b. in the two daughter cells together is equal to the number in the mother cell
Cor.X.28 c. in a daughter cell is double the number in the mother cell
d. in a daughter cell is half the number in the mother cell

A 8. Which of the following two structures occur only in animal cell mitosis?
3
P .43
a. centrioles and centrosomes
Cor.I.12 b. spindle and aster
Cor.X-.05 *c. centriole and aster
d. centrosomes and spindle

A 9. Since there are no centrioles or asters in a dividing plant cell, we can assume that a plant cell
3
P .87
a. doesn't really divide
Cor.I.24 *b. differs in this respect from a dividing animal cell
Cor.X.25 c. has not been carefully observed
d. is not a living cell

A 10. Reproductive cells in a normal human being are produced
3
P .33 a. in greater numbers by the female than the male
b. for a longer period in the female than in male
Cor.I.08 c. in equal numbers by both sexes
Cor.X.10 d. by the gonads from birth to death
*e. in larger number for a longer period of time in the male

A 11. The most important outcome between the two processes, mitosis and meiosis, is which one of the following?
3
P .68
*a. the number of chromosomes in each cell
Cor.I.34 b. the number of divisions that the original cell has made
Cor.X.10 c. the size of the resulting cells
d. the number of cells
e. the number of nuclei in each cell

A 12. The part of the cell generally associated with the transmission of heredity traits is the
3
P .36
*a. nucleus
Cor.I.32 b. plasma membrane
Cor.X.21 c. cytoplasm
d. chloroplast
e. centrosome

A 13. When a cell undergoes meiotic division in the ovary of a
3 human, the following events occur
P .44

I a cell division occurs without duplication of the chromosomes
Cor.I.16 II each chromosome replicates (duplicates).
Cor.X.25 III a monoploid (n) cell is formed
IV the chromosomes with their duplicates are moved to the
poles of the cell along the spindle fibers

What is the correct sequence in which these events occur?

a. I, IV, II, III
*b. II, IV, I, III
c. I, II, IV, III
d. IV, II, I, III

A 14. The centrosomes with their centrioles, the spindle and the
3 asters are known as
P .76

a. the nucleus
Cor.I.46 *b. the mitotic apparatus
Cor.X.19 c. the meiotic apparatus
d. cell division
e. DNA

A 15 Walter Flemming made an effort to observe mitosis in living
3 cells as well as observing fixed and stained preparations of
P .37 dividing cells. Observations on living cells were necessary
in order to

Cor.I.13
Cor.X.14 a. see the chromosomes
*b. make sure that materials seen in fixed and stained
cells were not artificial results due to the fixing
and stain procedures
c. learn about cell division because staining cells often
kills the cells and dead cells can't divide
d. count the chromosomes
e. all of these

A 16. Chemical analysis and other techniques can be utilized to
3 determine the amount of DNA per cell in certain bacteria and
P .45 higher organisms. Investigators have found that at certain
times the amount of DNA is the same in different kinds of
Cor.I.30 cells of the same organism. At other times they have found
Cor.X.03 that this is not true. In which one of the following is the
latter true?

a. cells that are producing granules probably by the activity
of the golgi bodies
b. cells that show a decrease in activity of the ribosomes
*c. cells that are in an early stage of mitosis
d. cells resulting from mitosis
e. all body cells resulting from cell division

CHAPTER VII

A
3
P .58
Cor.I.10
Cor.X.08

17. If a cell of a potato plant has 16 pair of chromosomes

- a. each monoploid pollen grain nucleus will have 32 chromosomes
- b. each cell of the next potato plant generation will have 32 chromosomes
- c. each cell of the next generation will have 32 pair of chromosomes
- *d. each diploid egg cell will have 16 pair of chromosomes

A
3
P .29
Cor.I-.07
Cor.X-.02

18. The number of chromosomes per cell typically

- a. is constant for all cells in both sexes of a species
- b. is constant for all cells
- c. changes from tissue to tissue in an organ
- *d. is constant for all body cells within an individual

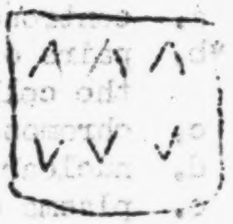
A
3
P .68
Cor.I.26
Cor.X.23

19. Meiosis occurs in the formation of

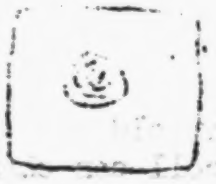
- a. all cells
- *b. reproductive cells
- c. muscle cells
- d. brain cells

A
3
P .68
Cor.I.12
Cor.X.11

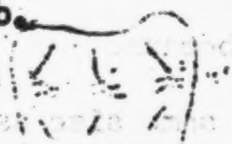
20. Select from one of the drawings below the stage of mitosis which immediately preceded this one



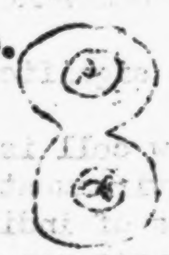
a.



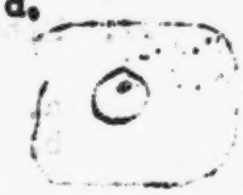
*b.



c.



d.



A
3
P .63
Cor.I.32
Cor.X.29

21. Meiosis is to reduction, as mitosis is to

- a. replication
- b. splitting
- c. deduction
- d. duplication
- *e. answers a and d

A
3
P .37
Cor.I.31
Cor.X.25

22. The most logical answer to describe the purpose of mitosis would be to provide the organism with

- a. an embryo
- b. offspring
- c. food
- *d. growth
- e. none of the preceding

A 23. The major advantage of meiosis is that it
3
P .52 a. revitalizes the organism
b. allows an increase in size
Cor.I.23 c. produces a fertilized egg
Cor.X.13 *d. prevents build up of the chromosome number

A 24. All the cells in an organism contains the same number of
6 chromosomes except the reproductive cells which contain
P .62
*a. one half the number
Cor.I.47 b. twice the number
Cor.X.13 c. three times the number
d. one fourth the number

A 25. The centriole
6
P .51 a. lies within a chromosome
b. appears on an astral fiber
Cor.I.20 *c. lies in the centrosome
Cor.X.13 d. is a part of the spindle
e. is in the nucleus

A 26. During mitosis the
6
P .84 a. centrosome disappears
*b. pairs of the chromosomes separate to opposite poles of
Cor.I.16 the cell
Cor.X.11 c. chromosomes divide unequally
d. nuclear membrane is present at all times
e. plasma membrane disappears

A 27. Mitosis is significant because
3
P .78 a. the new cell is the same size as the old
b. the environment of the developing cell can change the
Cor.I.35 species of individual formed
Cor.X.23 *c. it insures genetic continuity
d. it produces chromosomes

A 28. The production, generation after generation, of offspring
3 similar to their parents is called
P .92
a. fertilization
Cor.I.36 b. pollination
Cor.X.28 *c. genetic continuity
d. chromosomal constancy

CHAPTER VII

A
3
P .40

Cor.I-.04
Cor.X.02

29. Mitosis in plants and animals always results in

- *a. growth
- b. chromosome number being doubled
- c. genetic continuity
- d. one daughter cell
- e. meiosis

CHAPTER VII

B
2
P .39
Cor.I.35
Cor.X.24

1. When you compare a frog cell and a human cell, the most obvious difference is

*a. the DNA code
b. the amount of lack of DNA
c. the type of chromosomes
d. the chemical composition of the cell in general
e. the size of the centrosome and asters

B
3
P .49
Cor.I.53
Cor.X.26

2. If we assume a cat has 32 chromosomes and then examined a cell to find only 16 chromosomes, you might assume the following process had taken place

a. mitosis
b. mutation
*c. meiosis
d. replication has been completed
e. none of the above

B
3
P .48
Cor.I.24
Cor.X.14

3. Which one of the following statements is of the most fundamental importance in mitosis (all of the statements are true)

a. old cells divide to form new cells
b. cells are being worn away and replaced by new cells
*c. daughter cells receive DNA identical to that of the parent cell
d. chromosomes are only visible during actual cell divisions

B
3
P .30
Cor.I.00
Cor.X-.01

4. In comparing dividing skin cells with dividing embryo cells of a certain organism

a. reduction division is observed
b. chromosome content is different
*c. cell division rate differs
d. nuclear membranes present
e. cannot be compared

B
3
P .62
Cor.I.39
Cor.X.14

5. The text states that there are 46 chromosomes in cells of the human body. In fertilization the sperm unites with an egg. How many chromosomes are found in a fertilized egg?

a. 23
*b. 46
c. 69
d. 92

B
3
P .39
Cor.I.27
Cor.X.19

6. Parthenogenesis is the development of an unfertilized egg. In parthenogenic development of the frog egg, a tadpole will develop, but the tadpole will not develop into an adult frog. This phenomenon could be explained by the fact that

a. unfertilized eggs do not go through mitosis
*b. there are only ½ of the chromosomes necessary
c. life is impossible unless an egg is fertilized
d. the chromosomes cannot replicate themselves

B
3
P .44
Cor.I.24
Cor.X.23

7. Genetic continuity infers that generation to generation, offspring will be similar to their parents. Why, then, do variations occur?

a. mutations cause genetic changes
b. identical genes seldom are present
c. characteristics of both parents are involved
d. sperms and eggs carry half the normal chromosome content
*e. all of these

B
3
P .72
Cor.I.18
Cor.X.06

8. A cancerous cell is observed to divide abnormally. The following is suspected

a. DNA coding altered
b. mitotic stages incomplete
c. chromosomes injured
d. DNA transfer blocked
*e. all of these

B
3
P .27
Cor.I-.18
Cor.X-.03

9. Genetic continuity could not occur without meiosis because

a. organisms produced without mitotic division would die
*b. the genetic material carried by chromosomes would not be divided in sperm and egg cells
c. the number of chromosomes would double with each generation
d. one parent would contribute more to the offspring
e. all of these

B
2
P .55
Cor.I.07
Cor.X.09

10. The number of chromosomes is

a. larger, the more complex the organism
b. identical in all plants
c. smaller in the more comples animals
*d. unrelated to the complexity of an organism

B
3
P .71
Cor.I.16
Cor.X.09

11. A certain flowering plant has all red flowers. If a white flower should appear on the branch and these seeds were planted and all white flowers appeared, we could assume that one of the following processes took place

a. mitosis
b. meiosis
c. natural selection
*d. mutation

CHAPTER VII

B
3
P .41
Cor.I-.08
Cor.X-.13

12. Since in one phase of cell division the chromosomes make exact duplicates of themselves, we can conclude that

- a. the cell will eventually run out of raw material to make chromosomes
- b. the daughter cells will contain an equivalent number of chromosomes
- c. the chromosomes are important in respiration
- *d. duplication of chromosomes insures genetic continutiy

CHAPTER VII

C
3
P .40
Cor.I.47
Cor.X.31

1. An organism normally has 15 pairs of chromosomes in each cell. Upon examination, under a microscope, one finds only 15 chromosomes in each cell. The most reasonable explanation is

   a. a mutation has occurred
   b. these cells are divided
   *c. one is observing a sex cell
   d. reproduction of this organism does not involve sex
   e. this is a freak

C
6
P .44
Cor.I.10
Cor.X.03

2. A biologist hypothesizes that it is possible for mitosis to occur without being followed by division of the cytoplasm. Which one of the following observations would not lend as much support to his hypothesis as the remaining three?

   a. we sometimes find one-celled organisms with more than one nucleus
   b. cells that make up heart muscle tissue have a great many nuclei with one inter-connected mass of cytoplasm
   c. some kinds of molds (fungi) have cells that have incomplete cell walls
   *d. mature red blood cells of humans lack a nucleus

C
3
P .14
Cor.I.01
Cor.X.12

3. An organism normally has 20 pairs of chromosomes in each cell. Observing the cells under a microscope, a student found 10 chromosomes in each cell. He was most likely looking at

   a. cell divisions
   b. mitotic divisions
   c. a body cell
   d. an egg and sperm united
   *e. a monoploid number of chromosomes

CHAPTER VII

D
3
P .74

1. Cellular continuity through mitosis is the basis of all of the following except

Cor.I.42
Cor.X.18

a. genetic continutiy
b. development
c. heredity
d. reproduction
*e. differential permeability

D
6
P .19

2. In mitosis the DNA is deplicated and then divided equally between the two daughter cells. If this did not happen, what would happen to the field of taxonomy?

Cor.I.15
Cor.X-.08

*a. become confused
b. stay the same
c. become less complicated
d. unable to determine
e. none of the above

CHAPTER VIII

A
4
P .54
Cor.I.24
Cor.X.30

1. Biological succession ends with the establishment of a

a. food web
*b. climax community
c. carbon cycle
d. pyramid of numbers

A
4
P .48
Cor.I.57
Cor.X.39

2. The primary consumers in the community are best described by

a. bacteria
b. a cat that eats a mole
*c. rabbits that eat leaves and stems
d. molds
e. none of these

A
1
P .62
Cor.I.40
Cor.X.20

3. Evolution is the process of

a. nitrogen cycle
b. carbon-hydrogen-oxygen cycle
c. mitosis
*d. mutation plus natural selection
e. meiosis

A
4
P .79
Cor.I.27
Cor.X.12

4. Farmers plow legumes into the soil to enrich the soil for the next crops. What is probably added to the soil?

a. carbon
*b. nitrates
c. ATP
d. oxygen

A
4
P .61
Cor.I.34
Cor.X.31

5. In the pyramid of numbers there will always be, in number

a. more secondary consumers than primary consumers
*b. fewer secondary consumers than primary consumers
c. more secondary consumers than producers
d. more primary consumers than producers

A
4
P .57
Cor.I.31
Cor.X.22

6. Which of the following shows the correct organization of the living world?

*a. atoms-tissues-organ systems-species-biosphere
b. cells-species-organs-communities
c. organ systems-species-tissues-organs-biosphere
d. biosphere-species-organs-cells-communities-atoms

CHAPTER VIII

B
4
P .63
Cor.X.42
Cor.X.29

1. In a certain region the eyes of deer are parasitized by flies. Assume that the eye flies can live only as parasites on the eyes of the deer. The principal food in the diet of the deer is blueberry bushes. What is the food chain?

*a. producer, blueberries, primary consumer, deer, secondary consumer, eye flies
b. producer, deer, primary consumer, blueberries, secondary consumer eye flies
c. producer, eye flies, primary consumer, deer, secondary consumer, blueberries
d. producer, sun, primary consumer, deer, secondary consumer, eye flies

B
4
P .52
Cor.I.10
Cor.X.06

2. An oriental beetle which feeds only on eye flies is now brought into the region. If the beetles thrive, what will be the probable effect on the organism involved in the food chain?

a. the eye fly population will increase
*b. the deer population will increase
c. the blueberry population will increase
d. all populations other than the beetle poulation will decrease

B
7
P .73
Cor.I.36
Cor.X.18

3. Wild rabbits have many offspring per year whereas bears rarely have more than two offspring per year. This should tell you that

*a. the individual bear has a greater chance of survival
b. the individual rabbit has a better chance for survival
c. the fields will be over-run by rabbits
d. bears have a short life span

B
4
P .69
Cor.I.35
Cor.X.16

4. After a fire in an area, some plants like grass start to grow again in the burned area. As time passes, finally the old original native plants take their place and the plant life remains stable for many years. This is called

a. biosphere
b. food web
c. nitrogen cycle
*d. succession

B
4
P .89
Cor.I.12
Cor.X.19

5. Which of the following animals would you expect to be fewest in number within a given natural area

a. field mice
b. snakes
*c. mountain lions
d. rabbits

B
4
P .46

Cor.I.33
Cor.X.10

6. The "food web" is comprised of many organisms, both plant and animal. Which of the following is most necessary for the perpetuation of the web?

a. increase in number of secondary consumers
b. ability of the world to support increased numbers of the "lucky" members of the web
c. control of the numbers of producers
*d. the effectiveness of the decomposers

B
4
P .96

Cor.I.13
Cor.X.05

7. A volcano explodes from the floor of the ocean 50 miles off the coast of Mexico. The resulting island should gradually become populated with living organisms. Predict the most likely order of colonization

*a. blue-green algae, grass, trees, birds, snakes
b. birds, snakes, trees, blue-green algae, grass
c. trees, grass, birds, snakes, blue-green algae
d. snakes, birds, trees, blue-green algae, grass
e. grass, trees, birds, snakes, blue-green algae

B
4
P .76

Cor.I.31
Cor.X.26

8. After a forest fire new growth will soon cover the blackened areas, and will change from season to season. When the succession of plants and their accompanying animals has essentially ended

*a. a climax community has been reached
b. pioneer trees will provide dense shade
c. low shrubbery will once more take over
d. seedlings will no longer grow

B
9
P .65

Cor.I.16
Cor.X-.06

9. If something destroyed the nitrogen fixing and nitrifying bacteria population in the soil, a probable result would be that there would be a reduction in available

a. fats
*b. proteins
c. disaccharides
d. monosaccharides

B
4
P .42

Cor.I.12
Cor.X.14

10. What would happen to the balance in nature in a pond community if the frogs suddenly had a population explosion while their main food source, the flies, and their enemies, the snakes, remained the same?

a. the flies would be completely wiped out
b. the frogs would die of starvation
c. the snakes would more easily catch the hungry frogs
*d. a new equilibrium of frogs, snakes, and flies would be reached

B
4
P .67
Cor.I.37
Cor.X.39

11. The decomposers are largely missing in the fossil record because

a. they did not exist in prehistory
*b. they were too small and soft to be preserved
c. no one knows which ones were the decomposers then
d. early plants and animals were not decomposed

B
4
P .81
Cor.I.43
Cor.X.14

12. Which of the following would be an example of a food chain?

a. bear-rabbit-algae-mosquito
*b. grass, grasshopper, lizard, snake
c. lion-tiger-giraffe-mouse
d. rabbit-mouse-hawk-cougar

B
4
P .79
Cor.I.12
Cor.X.03

13. There are two islands (X andY) in the Pacific. The population of each island is entirely self-sufficient in regards to food. One of the islands (X) is entirely level country, suited either to the grazing of sheep or to the growing of crops. The other island (Y) is hilly, rugged ground that is suited only to grazing. Both islands cover the same area and have similar climates. The human population reaches the maximum on each island. Which island could support more people?

*a. X could support more than Y
b. Y could support more than X
c. X and Y both could support the same number
d. none of these

B
4
P .48
Cor.I.25
Cor.X.31

14. The most familiar complex animals and plants live on dry land, even though survival is difficult there. Complexity offers some problems as well as some advantages. Of the following which would be considered as closest to being most advantageous?

a. movement of the materials from place to place within the organism would require an elaborate transport system
*b. there would be a greater opportunity for the organism to try out all aspects of a multitude of diverse environments
c. reproduction and the development of a new organism are much more complicated
d. more energy is invested in the complex structure and the differentiation of specialized parts (i.e. tissues, organs, organ systems) is complicated

B
4
P .66

Cor.I.27
Cor.X.19

15. Microcosm means "small world". A microcosm is constructed by placing a goldfish, water plants, and water into a glass container which can be made airtight. This container should be kept in a well-illuminated area of the room. Which of the following statements best describes the probable results of this experiment?

a. the fish will die because of lack of oxygen
b. the plant will die because of the lack of carbon dioxide
c. the gases present in the water will soon disappear
*d. the fish and the plants through their interdependence in the underwater environment will survive

CHAPTER VIII

C
4
P .31

Cor.I.02
Cor.X.01

1. In a pond community, if fish inhabitants suddenly increased greatly in number, the outcome probably would be

   a. the fish would develop different eating habits
   b. green algae and other producers would increase in production to balance nature
   *c. the food web would help maintain the stability of the pond community
   d. the big fish would survive and the small ones would be depleted and bring about stability .

C
6
P .32

Cor.I-.01
Cor.X.02

2. Hospitals used to take plants and flowers out of sick rooms at night, since this was supposed to be bad on patients (plants in dark room). This old wives tale may have merit because

   a. hyperventilation may occur due to the excess of oxygen in room
   b. some plants may be poisonous in the dark
   c. insects which live on the plants during the day look for blood at night
   *d. plants reverse the oxygen-carbon dioxide process at night

C
4
P .77

Cor.I.29
Cor.X.35

3. A farmer had two fields. In field A he planted cotton and in field B he alternately planted alfalfa and cotton. He found after ten years

   *a. a greater yield of cotton in B than A
   b. a greater yield of cotton in A than B
   c. no difference in the output of the cotton and alfalfa in A and B
   d. the soil useless in both A and B
   e. none of these

CHAPTER VIII

D
4
P .18

Cor.I-.19
Cor.X-.14

1. The study of the carbon cycle, from photosynthesis in plants to respiration in both plants and animals, shows most clearly

a. the difference between plants and animals
b. the interdependence of living things
*c. the conservation of mass
d. the carbon cycle is dependent upon the water cycle

D
3
P .43

Cor.I.11
Cor.X.17

2. A liger is to a tiger as a mule is to

*a. horse
b. donkey
c. burro
d. jenny
e. lion

D
4
P .42

Cor.I-.01
Cor.X-.11

3. Saw-fly larvae were found to be attacking the tamarack trees around a lake. The larvae went into the sphagnum moss at the base of the tree to pupate. Two type of mice ate the pupae. Later, owls came to live in the near-by pine forest and began to kill off the mice.

a. the saw-flies in that locality would all be killed, and eaten by the mice
*b. the tamarack trees would be injured or killed, because neither the mice nor the owls would help them survive
c. the number of mice would increase
d. the moss would grow more luxuriantly
e. the saw-fly larvae would be eaten by the owls

CHAPTER IX

A 1. Which of the following can replicate in a living cell?
6
P .53 a. glucose
b. water
Cor.I.25 c. fatty acids
Cor.X.19 *d. nucleic acids
e. maltose

A 2. The outer sheath of a virus has been enemically analyzed and
6 found to be made up of
P .72
a. cellulose
Cor.I.39 b. fat
Cor.X.17 *c. protein
d. carbohydrate

A 3. Viruses reproduce by
8
P .52 a. fission
b. mitosis
Cor.I.29 c. meiosis
Cor.X.26 d. budding
*e. none of the above

A 4. In virus replication, the virus DNA
6
P .71 a. is the same as the DNA of the host cell
*b. takes control of the host cell's activities
Cor.I.40 c. always destroys the host
Cor.X.19 d. sometimes produces beneficial results
e. assumes some of the DNA characteristics of the host

A 5. Viruses are considered to be living because
6
P .64 a. they contain RNA and DNA
b. they reproduce themselves
Cor.I.29 c. they have genetic recombination
Cor.X.18 *d. all of these

A 6. The smallest of all microbes are the
8
P .75 a. bacteria
*b. viruses
Cor.I.38 c. yeasts
Cor.X.19 d. spirillum
e. flagella

A 7. In a relationship between a virus and its host
5
P .43 a. the virus will kill the host
b. the virus will be passive
Cor.I.11 *c. changes may take place in the host such as the production
Cor.X.08 of new proteins
d. rapid growth will result producing secondary hosts

A
8
P .12
.20
Cor.I.24
Cor.X.15

8. Which of the following is not caused by a virus?

a. warts
b. influenza
c. poliomyelitis
*d. pneumonia
e. chicken pox

A
6
P .27
[illegible]
Cor.I.26
Cor.X.23

9. Bacteriophage and most animal viruses resemble one-celled organisms in that they have

a. digestive enzymes
b. cell membranes
*c. genes
d. flagella for locomotion

A
3
P .66
[illegible]
Cor.I.14
Cor.X.08

10. Viruses are useful organisms for the study of genetics because they

a. do not mutate
b. are easy to see and raise
c. have simple food requirements
*d. they reproduce in a short time

A
6
P .60
[illegible]
Cor.I.49
Cor.X.36

11. Which one of the following statements is thought to be true about viruses?

a. when a virus attacks a cell the entire virus enters the host
*b. the virus causes the host cell to produce the viral nucleic acids
c. viruses can reproduce in the presence of proper nucleic acids in test tubes
d. one host cell will reproduce one virus

A
4
P .78
Cor.I.50
Cor.X.18

12. Choose the statement which is true of viruses

a. all cause diseases of some type
*b. are parasitic
c. are visible with a compound microscope
d. generally have no effect on man
e. are larger than most bacteria

CHAPTER IX

B
3
P .49

Cor.I.23
Cor.X.15

1. Mutation may be either harmful or beneficial. A harmful mutant phage is

   a. easier to destroy
   b. more apt to die out because of the mutation
   c. at the lowest ring of the evolution scale
   d. capable of reconstitution of lost characteristics
   *e. often more resistant to control

B
4
P .59

Cor.I.55
Cor.X.35

2. In the relationship between the viral phage and bacteria, the bacterium

   *a. provides an enzyme system for the phage
   b. kills the phage
   c. uses phage DNA to reproduce itself
   d. is killed upon entrance of the phage

B
6
P .47

Cor.I.25
Cor.X.13

3. The virus host relationship has been called the master-slave relationship. This is based on the fact that

   a. the phage can kill the host
   b. the phage is larger than the host
   *c. the phage DNA or RNA can take over control
   d. the phage reproduces so rapidly and in such great numbers the host is transformed into a secondary phage
   e. new proteins are built by the host to accommodate the phage

B
6
P .71

Cor.I.50
Cor.X.51

4. In order to reproduce or replicate itself the cucumber mosaic virus must

   a. have moist, warm conditions
   b. have dry, cool conditions
   c. have carbon dioxide and sunlight
   *d. be present in the living cells of the host

CHAPTER IX

C
9
P .80

Cor.I.34
Cor.X.29

1. A communicable disease of the respiratory tract and normally not found in Southern California became quite widespread in the Los Angeles area. Repeated attempts to culture the responsible organism failed and sputum cultures examined under a light microscope were always negative. The organism most likely responsible for this disease was probably a

   a. bacteria
   b. protozoan
   *c. virus
   d. fungus

C
4
P 165

Cor.I.37
Cor.X.22

2. Since crystallized viruses retain their infective properties, we can conclude that

   a. the crystallization was improperly done
   b. the crystals became contaminated
   *c. the viruses have properties quite unlike any other organism
   d. they are very primitive living organisms

CHAPTER IX

D
4
P .54
Cor.I.24
Cor.X.20

1. The most successful virus would

   a. cause the death of its host
   *b. allow its host to live
   c. cause disease in its host
   d. remain stable by not reproducing

D
6
P .61
Cor.I.11
Cor.X.13

2. What structural or functional observation causes us to relate viruses to the beginning of the evolutionary chain of living organisms?

   a. they have no enzymes
   b. they are capable of reproduction
   c. they are larger than atoms and molecules
   d. they are smaller than bacteria
   *e. all of the above

D
1
P .17
Cor.I.15
Cor.X.01

3. An Entomologist studying destruction of a valuable plant by insect larvae found that insecticide control measures were ineffective. He found that by using a virus to cause a disease in the larvae he could eliminate the problem successfully. How can you account for the fact that the virus can successfully destroy the insect pest while the insecticide treatments failed?

   a. the insecticides are incapable of altering chemical activities in the cells of the larvae
   b. the relationship between this parasite and its host eventually brings about death of the host
   c. the virus has the ability to bring about changes in cell structure that cannot be done by chemicals
   d. two of the above are correct
   *e. all of the above are correct

CHAPTER

A
8
P .68
[illegible]
Cor.I.38
Cor.X.15

1. Bacteria are usually classified into three major groups. If you observed a bacteria on a slide, it would be placed into one of these groups according to its

   a. size
   *b. shape
   c. protein content
   d. locomotion

A
8
P .71
[illegible]
Cor.I.12
Cor.X.06

2. The first person to see and accurately describe bacteria was

   *a. Leeuwenhoek
   b. Pasteur
   c. Koch
   d. Fleming

A
4
P .76
[illegible]
Cor.I.37
Cor.X.23

3. In which of the following geographical locations would it be impossible to find microbes?

   a. North Pole
   b. South Pole
   c. Equator
   d. Alaska
   *e. none of these

A
6
P .50
[illegible]
Cor.I.49
Cor.X.15

4. Bacteria which can synthesize their organic compounds from simple inorganic substances are

   a. asexual
   *b. autotrophic
   c. pathogens
   d. heterotrophic

A
3
P .17

Cor.I-.11
Cor.X-.10

5. Before the bacterium can divide, it must

   *a. split its chromosomes lengthwise
   b. duplicate the original chromosomes
   c. provide a suitable substrate for the splitting
   d. get rid of the flagellum

A
8
P .56

Cor.I.41
Cor.X.29

6. If a bacteria is round it would be classified as a

   a. bacillus
   *b. coccus
   c. spirillum
   d. spirochete

A 7. The early micrsocopist who became the first man to observe
1 micro-organisms was
P .88

*a. Anton Van Leeuwenhoek
Cor.I.29 b. Nehemiah Grew
Cor.X.01 c. Robert Hooke
d. Marcello Malpighi

A 8. Which of the following is not a type of bacteria?
8
P .55 a. coccus
b. bacillus
Cor.I.40 c. flagellated bacteria
Cor.X.11 *d. bacteriophage
e. spirillum

A 9. A structure formed by some bacteria which enables it to
6 survive unfavorable conditions
P .85

a. bacillus
Cor.I.29 b. coccus
Cor.X.12 *c. endospore
d. spirillum

A 10. Bacteria are to endospores as
6
P .29 a. cells are to tissues
b. plants are to chlorophyll
Cor.I.08 *c. protozoa are to spores
Cor.X.02 d. bacteria are to humans

A 11. The bacterium differs from a cell of an organism higher on
6 the scale of organization in that it does not have similar
P .32

a. cell walls
Cor.I.26 b. cytoplasm
Cor.X.18 c. ribosomes
d. cell membranes
*e. mitochondria

A 12. Rod shaped bacteria are called
2
P .59 *a. bacilli
b. cocci
Cor.I.45 c. spirilli
Cor.X.26 d. spirochetes

A
3
P .71
Cor.I.08
Cor.A-.01

13. In selecting a test organism for genetic study we find that even though there is no nucleus in the cells, the organism exhibits the advantages of sexual reproduction. We may conclude from this that

a. the nucleus is not important
*b. some forms of life do not need a nucleus to reproduce sexually
c. the genes are held in granules within the cell
d. this organism does not exhibit genetic contimutiy

A
4
P .58
Cor.I.32
Cor.X.02

14. Living things that cannot synthesize their own organic compounds from simple inorganic substances are referred to as

a. plants
b. autotrophic organisms
*c. heterotrophic organisms
d. green organisms

A
6
P .50
Cor.I.20
Cor.X.28

15. The characteristic that identifies bacteria as plant is

a. green color
*b. cell wall
c. flagellum
d. manufacture of food

A
6
P .32
Cor.I-.01
Cor.X-.13

16. How do bacterial cells differ from most plant and animal cells?

a. there is no cell wall or nucleus
b. there is no cell membrane or cytoplasm
*c. many bacteria have a reproductive structure or spore in their cytoplasm as well as flagella
d. there are no significant differences between bacterial cells and those of most plants and animals

A
6
P .49
Cor.I.34
Cor.X.16

17. Although many scientists prefer to classify one-celled organisms as Protista, these plant-like qualities make bacteria a member of the plant kingdom

a. many flagella for movement
b. indefinite nuclear membrane
*c. a rigid cell wall
d. lack of mitochondria

A
9
P .22
Cor.I.13
Cor.X.20

18. One triple bacterial mutant cannot synthesize substances A. B. and C. A second triple mutant cannot synthesize substances D. E. and F. If both strains are mixed, sexual reproduction would be demonstrated if some offspring could grow on a medium containing

a. substances A, B, and C
b. substances D, E, and F
*c. neither A, B, and C, nor D, E, and F
d. both A, B, and C and D, E, and F

A
3
P .71

Cor.I.08
Cor.A-.01

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4
P .58

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Cor.X.02

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P .49

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P .22

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Cor.X.20

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b. substances D, E, and F
*c. neither A, B, and C, nor D, E, and F
d. both A, B, and C and D, E, and F

CHAPTER X

B 1. A refrigerator helps prevent food from spoiling because
4
P .66 a. bacteria are killed
b. toxins produced by the bacteria are killed
Cor.I.20 *c. bacterial reproduction is slowed down
Cor.X.20 d. bacteria cannot survive at low temperatures found in refrigerators

B 2. What is the significance of the fact that mutations are inheritable?
1
P .66
a. young are different from their parents
Cor.I.10 b. evolution can occur
Cor.X.00 c. species may become temporarily adapted to their environment
*d. all of the above

B 3. All animals have
8
P .46 a. autotrophic-photosynthetic nutrition
b. autotrophic-chemosynthetic nutrition
Cor.I.35 c. heterotrophic-photosynthetic nutrition
Cor.X.31 *d. heterotrophic-chemosynthetic nutrition

B 4. The motility of some single-cell bacteria may be likened to that of the
6
P .38
a. virus
Cor.I.20 b. elodea
Cor.X.13 c. sting-ray
d. shark
*e. sperm

B 5. If you arrived on a distant planet and discovered that there were a number of recognizable endospores, yet the surface
4
P .40 temperature showed, outside your space suit, a reading of 120°C, you could conclude

Cor.I.08
Cor.X.28 a. you brought them with you
b. the planet was not at this temperature for the duration of its existance
c. you are apparently not the first to arrive
*d. it must be a mutant strain

B 6. The autotrophic-photosynthetic organisms are similar to heterotrophic-chemosynthetic organisms in that both
4
P .31
a. require inorganic substances and complex organic molecules
Cor.I-.19 to synthesize their living substances
Cor.X-.21 b. synthesize their living substances from carbon dioxide and similar inorganic molecules
*c. transfer energy from glucose to ATP in similar cellular processes called respiration
d. obtain their supply of glucose in the same manner
e. depend on enzymes of other living organisms to synthesize glucose

B
2
P .17

Cor.I.04
Cor.X.02

7. To a bacteriologist, which of the following means would be least reliable in classification of bacteria?

a. type of colony produced by a species
*b. kinds of molecules used for food
c. structure of the organisms
d. color of the colony produced by a species
e. stain acceptance of the organisms

B
4
P .18

Cor.I.12
Cor.X.04

8. Bacteria can divide every 20 minutes. In this way the bacteria could reproduce a mass 4 times the size of the earth in 48 hrs. The typical growth curve shows a slow start, a period of rapid growth, a period of declining growth and rapid death. Which of the following would not be a controlling growth factor?

*a. lack of space
b. lack of food
c. lack of individuals
d. production of toxic substances

CHAPTER X

C
9
P .88

Cor.I.24
Cor.X0.03

1. If all bacteria were suddenly erased from the surface of the earth

   a. animals would have difficulty in digestion of food
   b. refuse in the form of organic material would soon be knee deep
   c. many plants would be unable to live
   *d. all of these

C
9
P .74

Cor.I.33
Cor.X.33

2. Two bacterial strains were mixed in a culture tube. One was able to utilise glucose. The other was able to use only lactose for nutrition. After allowing enough time for reproduction, single cells were tested for nutritional requirements. If NO sexual reproduction had occured one would expect to find bacteria able to use

   a. both glucose and lactose
   b. neither glucose or lactose
   *c. only glucose or only lactose
   d. galactose only

C
3
P .84

Cor.I.42
Cor.X.11

3. A test tube containing nutrient media is innoculated with two different pure strains of bacteria. One of the strains is able to metabolize only glucose while the other strain can only utilize galactose for its nutrition and metabolism. The bacteria in the tube are permitted to grow, without disturbance, for several days. Then using a special bacteriological technique individual cells are tested for their nutritional requirements.

   If sexual reproduction had occurred a biologist would expect to find bacteria able to use

   *a. both glucose and galactose
   b. sucrose
   c. galactose only
   d. glucose only

C
4
P .48

Cor.I.01
Cor.X0.08

4. When Schroeter examined bacteria grown on a potato and noted that they were all the same type, he was justified in concluding that

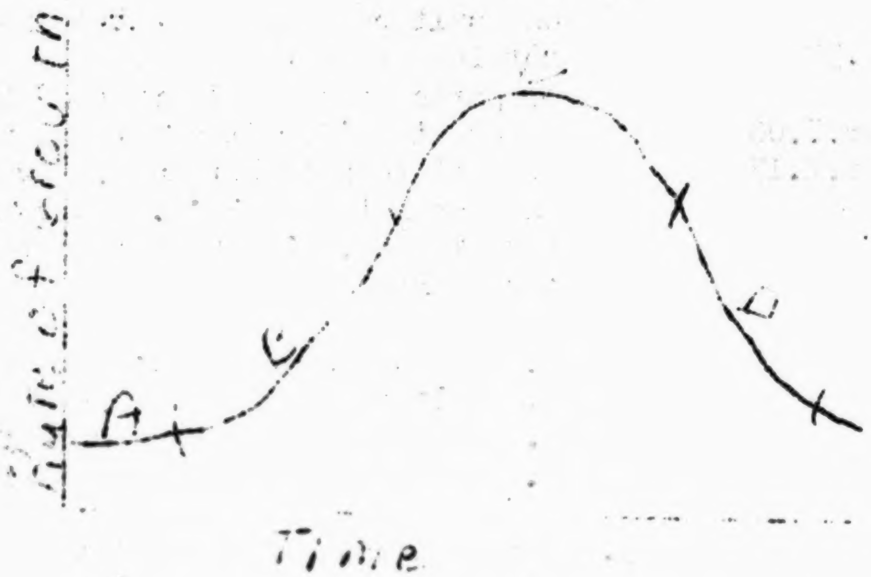
   a. the laboratory contained only one type of bacteria
   b. the potato could not support a variety of bacteria
   c. the bacteria all came from a single cell which landed on the potato
   *d. he had obtained a pure culture

C
4
P .26

Cor.I.69
Cor.X.02

5. The graph represents a bacterial growth curve plotted against time. What portion of the graph indicates an environmental change incompatible with life?

a. A
b. A and D
*c. D
d. B
e. C



CAHPTER X

D
9
P .48

Cor.I.17
Cor.X.21

1. If a bacterium divides every 20 minutes (undisturbed), how many bacteria would there be at the end of two hours?

a. twelve
b. sixteen
*c. sixty-four
d. one hundred and twenty-eight

D
9
P .32

Cor.I.06
Cor.X.17

2. You were given two pure cultures of bacteria and told that one culture causes a fatal disease in man and the other was obtained from the soil. You labeled them A and B. After preparing a sub-culture from the specimens, they were incubated at 25°C. It was found that only the culture from B grew at this temperature. Two more sub-cultures were prepared and incubated at 37°C. Only the culture from A grew at this temperature. On the basis of this information you could conclude that

a. culture A must have come from the soil
b. culture B must have been the pathogen of man
*c. culture B must have come from the soil
d. not enough data given to form a conclusion

D
4
P .80

Cor.I-.02
Cor.X.14

3. Farmer A has had a consistantly high yield of crops from his fields for many years. It was determined that he grew a legume crop for one year and cash crops for two years. Which of the following reasons might explain this farmers success?

a. soil high in nitrogen fixing bacteria
b. low level of pathogenic organisms
c. soil high in organic matter
d. essential soil minerals available
*e. all of these

D
3
P .71

Cor.I.41
Cor.X.02

4. If an organism was found on another planet with no nucleoli, no nuclear membrane, and no typical mitosis, but they do reproduce and transmit hereditary characteristics, you should classify them as

a. spirilla
b. cocci
c. animal
d. plants
*e. living

D
4
P .49

Cor.I.35
Cor.X.24

5. The destruction of all bacteria would bring life on the earth to an end, because

a. they are the hardest organisms to kill
b. the organisms that feed on bacteria would starve, initiating a chain of starvation reaching to man
*c. the available nutrients would presently be immobilized in undecayed vegetation and animal bodies
d. evolution begins with bacteria

D
6
P .57

6. The presence of the nitrifying bacteria might well be related to the amount of which kind of organic substances in plant tissue?

Cor.I.15
Cor.X.10

a. carbohydrates
*b. proteins
c. fats
d. alcohol

CHAPTER XI

A
4
P .71
Cor.I.24
Cor.X.29

1. The following bacterium inhabits the surface and deeper parts of the skin

*a. Staphylococcus epidermidis
b. Escherchia coli
c. Clostridium acetobutylicum
d. Diplococcus pneumoniae

A
8
P .76
Cor.I.38
Cor.X.32

2. The first vaccination was performed by Edward Jenner against

a. rabies
*b. smallpox
c. diptheria
d. tuberculosis

A
8
P .28
Cor.I.28
Cor.X.16

3. Active immunity is acquired by one of the following

*a. the injection of antigens called toxoids
b. taking antibiotics
c. an injection of antiserum
d. by use of exotoxins
e. none of these

A
8
P .48
Cor.I.08
Cor.X.03

4. An agent which kills microbes is

*a. a germicide
b. an homicide
c. a parasite
d. a saprophyte

A
8
P .49
Cor.I.55
Cor.X.23

5. Pathogenic organism

a. live on one living food supply
*b. cause disease
c. cause fermentation
d. cause decay

A
8
P .30
Cor.I.07
Cor.X.00

6. Which of the following diseases are caused by bacteria?

a. influenza
b. poliomymelitis
c. fever blisters
d. common cold
*e. none of these

A
8
P .69
Cor.I.32
Cor.X.26

7. Toxins are poisons produced by

a. virus
*b. bacteria
c. organism
d. tissues

A
6
P .81
Cor.I.43
Cor.X.11

8. Harmful activities of bacteria include

*a. production of toxins
b. production of antibodies
c. production of acetic acid
d. production of cheeses
e. productinn of nitrogen in the nitrogen cycle

A
8
P .43
Cor.I.14
Cor.X.08

9. Substance produced by other organisms which inhibit the growth of certain bacteria are called

a. antitoxins
*b. antibiotics
c. bioassays
d. antiseptics
e. actinomycetes

A
8
P .32
Cor.I.15
Cor.X-.01

10. Which of the following diseases in man is not caused by a virus?

a. yellow fever
b. influenza
c. poliomyelitis
*d. malaria
e. mumps

A
6
P .34
Cor.I.38
Cor.X.15

11. The organism which lives on decaying organic material is the

*a. saprophyte
b. carnivore
c. parasite
d. autotroph

A
6
P .21
Cor.I.22
Cor.X.04

12. The net energy gain from the breakdown of glucose in the cytoplasm will produce how many ATPs?

a. 38 ATPs
b. 4 ATPs
c. 34 ATPs
*d. 2 ATPs

A
6
P .23
Cor.I.21
Cor.X.15

13. The following question is concerned with energy relationships in carbohydrate metabolism.

Anaerobic respiration is to aerobic respiration as

a. more energy is to less energy
b. 34 ATP molecules are to one glucose molecule
*c. 2 ATP molecules are to 36 ATP molecules
d. some liberated energy is to no liberated energy

A
7
P .28
Cor.I.12
Cor.X.18

14. Passive immunity differs from active immunity in that

a. the body produces its own antibodies in passive immunity
b. it is more permanent than active immunity
c. a longer time is required to develop passive immunity
*d. passive immunity is immediately produced by injection of antibodies from another organisms
e. in passive immunity a vaccine is used which contains either dead or weakened disease-producing bacteria or viruses

A
4
P .52
Cor.I.48
Cor.X.17

15. Pathogenic organisms

a. live on a non-living food supply
*b. cause disease
c. cause fermentation
d. cause decay

CHAPTER XI

B
8
P .91

Cor.I.10
Cor.X-.19

1. Our knowledge of bacteria is related to preventive medicine by

a. purifying our water supplies
b. spraying for insect control
c. quarantining of people with diseases
d. using garbage disposals
*e. all of the above

B
7
P .51

Cor.I.53
Cor.X.15

2. The advantages of active acquired immunity over passive immunity are

a. there is less chance of developing a reaction
b. causes the body to build a maximum amount of antibodies immediately
*c. active acquired immunity lasts for a longer period of time
d. is for temporary immunization only

B
6
P .13

Cor.I-.23
Cor.X-.17

3. Of what significance to an effective immunization program against diptheria is the fact that the diptheria organisms secrete a protein toxin?

a. the active toxin can be injected into the individual without causing harm
*b. the toxin can be treated chemically and rendered harmless
c. in the chemically treated toxin the protein is destroyed and therefore cannot stimulate the production of antibodies
d. the protein of the toxin cannot be destroyed by the toxin can be rendered harmless by chemical treatment, thus stimulating the production of antibodies

B
6
P .58

Cor.I.15
Cor.X.15

4. Antibodies from the mother can pass through the placenta to the unborn child. Of what significance is this to the newborn child's ability to fight diseases?

a. cannot help the new born child fight off disease
b. is an example of artificial passive immunization
c. antibodies are not specific and therefore the antibodies received from the mother can prevent the newborn child from contracting all diseases
*d. antibodies are specific, therefore the antibodies received from the mother can prevent the newborn child from contracting only the diseases which the mother has had

B
7
P .38

Cor.I-.10
Cor.X-.18

5. Bacteria produce two types of toxins: endotoxins and exotoxins

a. exotoxins are difficult to control
b. exotoxins have low virulence
c. endotoxins have high virulence
*d. endotoxins are difficult to control

CHAPTER XI

C
9
P .52

1. If a bacterium is isolated in a sheep, which has just contracted a new disease X, which procedure below would be best to show that the bacterium caused the disease?

Cor.I.37
Cor.X.28

- a. find the same bacterium in other diseased sheep
- *b. inject the bacterium in a healthy sheep, produce same disease, and recover the same organism from the infected animal
- c. inject the bacterium into healthy sheep, isolate the sheep and observe for any unusual symptoms
- d. subject the bacterium to all available discriminatory tests, to see if it is physiologically similar to other bacterial species which cause disease in sheep

C
8
P .27

2. Koch probably assumed all of the following except

Cor.I.08
Cor.X-.04

- a. the organism believed to cause disease is always present
- b. the organism must be isolated and grown in pure culture
- *c. the organism must be able to reproduce
- d. inoculation of the organism into a healthy host must produce the disease
- e. disease producing organisms are always present when the disease occurs

C
9
P .60

3. A food processor found that many of his canned products were being returned because of bulging cans. He decided to make a thorough investigation of the canning process, but before he could complete the investigatinn he felt the best preventative procedure would be

Cor.I.36
Cor.X.18

- a. thorough washing of the vegetables
- b. increase cooking time
- *c. subject the canned product to more heat for a longer period of time
- d. freeze the canned product then thaw before delivery

C
9
P .74

4. A man and wife were exposed to the mumps when their daughter came down with the disease. Neither parent has had the mumps, but the man had chicken pox and measles whereas the wife hadn't

Cor.I.22
Cor.X.06

- a. the wife is more apt to contract the mumps
- b. the man is more apt to contract the mumps as he is probably less resistant to disease
- *c. both man and wife have an equal chance for contracting the mumps
- d. both are immune to mumps or else they would have had them during childhood

C
4
P .49

5. Most pathogens are highly specific - both as to tissue and host. The most likely explanation for this specificity is the

Cor.I.27
Cor.X.19

- a. mode of transmission
- b. method of reproduction
- c. host's resistance
- *d. essential environmental requirements are fulfilled

CHAPTER XI

D
6
P .62
Cor.I.49
Cor.X.25

1. Assuming that all known anthrax bacilli were killed by some wonder drug only to have the disease crop out again 20 years later. This would lead you to believe that

   a. spontaneous generation is possible
   b. all the bacilli had not been killed
   c. genetic recombination was responsible
   d. bacterial cross-breeding brought about a new strain
   *e. dormant endospores were united with a favorable growth environment

D
6
P .44
Cor.I.19
Cor.X.06

2. We find a new disease that suddenly swoops through out the population. We find that the carrier is the common house fly. From this we know that

   a. the disease is in the blood of its victims
   *b. the disease lives in the digestive tract of humans
   c. it cannot be spread by other animals
   d. mosquitoes will also carry it

D
4
P .32
Cor.I.19
Cor.X.11

3. Dr. Fleming's discovery of penicillin has been labeled "a lucky chance". We can conclude that

   a. anyone of us can be as lucky
   b. penicillin mold may have been seen by others before Fleming
   c. his discovery is not really great
   *d. he had the mind of a keenly trained scientist

D
6
P .25
Cor.I-.07
Cor.X-.04

4. Salt is commonly used as a preservative for meats such as pork. Which of the following is probably an explanation for this?

   a. salt changes the pH value to a highly acidic condition which is unfavorable to putrefication bacteria
   b. salt changes the pH value to a highly alkaline condition which is unfavorable to putrefication bacteria
   *c. salt plasmolizes the bacterial cells so they cannot function
   d. salt causes the bacterial cells to burst
   e. the bacteria cannot assimilate salt

D
4
P .60
Cor.I.41
Cor.X.04

5. If an area had a temperature of less than 0°C for three years

   a. all life would perish
   b. all bacteria would perish
   *c. only endospore-producing bacteria would survive
   d. most bacteria would recover after the temperature raised above 0°C.

D
7
P .97

Cor.I.24
Cor.X.04

6. When John was a boy he had such a mild case of polio that it went unnoticed by both him and his parents. When in college both his roommates became ill with the disease but John remained well. Which might best explain his remaining well?

*a. he had gained an immunity by his early exposure to the disease
b. he was just fortunate
c. he probably was not exposed while in college
d. he always wore a mask when around his sick friends

CHAPTER XII

A
2
P .20

Cor.I.01
Cor.X.01

1. The basic characteristics that place the slime mold in a unique position is
   - a. the fusion of gametes that become amoeboid with the formation of a new plasmodium
   - b. the ability for a miraculous metamorphosis to take place in a relatively short time
   - c. a relationship to old world single celled plants and animals
   - *d. evolutionary characteristics of the organism

A
8
P .58

Cor.I.34
Cor.X.29

2. Select the item listed b[illegible]that does not apply to one or another of the structures produced during the life cycle of the bread mold, (Rhizopus)
   - a. hypha
   - b. sporangium
   - c. zygote
   - *d. ascus

A
8
P .90

Cor.I.13
Cor.X.13

3. Bread mold belongs to the group of
   - a. algae
   - b. mosses
   - *c. fungi
   - d. ferns

A
6
P .29

Cor.I.27
Cor.X.25

4. True fungi
   - *a. never contain chlorophyll
   - b. are usually autotrophic
   - c. are always dependent on water to complete the reproductive process
   - d. usually exhibit alternation of generation

A
4
P .54

Cor.I.20
Cor.X.17

5. When considering the balance of nature, certain fungi play an important role in maintaining some chemical cycles. They aid those chemical cycles by
   - a. producing substances such as antibiotics which inhibit the growth of other organisms
   - *b. taking part in the process of decay
   - c. providing an important source of food for other plants
   - d. causing disease which may result in death to many animals

A
6
P .52

Cor.I.07
Cor.X.01

6. Most true fungi exhibit an evolutionary change by which they have become adapted to a land environment. This particular change is
   - a. amoeboid movement as exhibited by the slime mold
   - *b. a modification of sexual reproduction in which parent strains form special hyphae that fuse with one another
   - c. a root for the absorption of water from the soil
   - d. an autotrophic means of obtaining food

A 7. The stage of the slime mold life cycle producing spores is the
3
P .33 a. plasmodium
b. slug
Cor.I.20 c. amoeboid stage
Cor.X.14 *d. fruiting body

A 8. The slime mold is an organism which
6
P .34 a. is divided into many cells
b. possess a confining cell wall like all plants
Cor.I.40 *c. possess many nuclei embedded in the cytoplasm
Cor.X.06 d. has a single nucleus like the ameba which it resembles

A 9. The one or more flagellated cells which arise from a spore of a slime mold may function as
3
P .31
*a. gametes
Cor.I.19 b. zygotes
Cor.X.19 c. both gametes and zygotes
d. sporangia

A 10. Molds cannot carry on the process of
6
P .46 a. assimilation
b. diffusion
Cor.I.48 c. excretion
Cor.X.31 *d. photosynthesis

A 11. All non-green plants do have
6
P .76 a. stems
*b. spores
Cor.I.37 c. leaves
Cor.X.29 d. roots

A 12. Yeasts reproduce by
3
P .67 a. fragmentation
b. meiosis
Cor.I.38 *c. budding
Cor.X.28 d. regeneration

A 13. The portion of the slime mold which produces spores is the
6
P .53 a. plasmodium
b. slug
Cor.I.35 c. amoeboid stage
Cor.X.17 *d. fruiting body

4 14. Germination of a spore of a slime mold requires

P .71 a. plenty of water
b. a suitable temperature only
Cor.I.07 *c. both plenty of water and suitable temperature
Cor.X.04 d. autotrophic capabilities

A 15. The metamorphosis in slime mold results in forming
6
P .42 a. vacuoles
*b. fruiting bodies
Cor.I.24 c. cytoplasm
Cor.X.19 d. nuclei
e. flagella

A 16. Asexual reproductive cells of fungi are called
6
P .55 a. seeds
*b. spores
Cor.I.18 c. gametes
Cor.X.14 d. isogametes

A 17. The slender threads found making up the bulk of a fungus are called
6
P .54
a. rhizomes
Cor.I.30 *b. hyphae
Cor.X.12 c. sporangia
d. gametophyte

CHAPTER XII

B
4
P .57

Cor.I.33
Cor.X.32

1. Complete the following: important biological principle - the lower the probability of survival of offspring

a. the greater the number of types of reproduction an organism will possess
b. the greater the number of species of that organism
*c. the greater the rate of production of offspring
d. usually there will be a greater number of gametophytes for that particular species

B
3
P .45

Cor.I.27
Cor.X.00

2. Why do fungi need to produce such a large number of spores to maintain the species?

a. spores live a short time
b. only a few spores have a chance for fertilization
*c. very few find a suitable environment for growth
d. death rate of fungi are high
e. none of the above really apply

B
9
P .23

Cor.I.12
Cor.X-.01

3. To determine if molds grow better in darkness or in light, two students inoculated a piece of moist bread with mold spores. One student put his bread in the window subjected to light. The other student covered the bread to exclude the light. Later, each reported to the other students that the molds had not grown much in either case. Of all the suggestions given exclude one

a. each member should perform the experiment both for light and darkness
*b. try to discover all the different substances upon which mold will grow
c. they should try to get different kinds of molds with which to experiment
d. each one should use a different medium, as bread or cheese

B
4
P .63

Cor.I.38
Cor.X.10

4. Fungi are decomposers of organic matter, as a result, man could benefit from this in one of the following ways

a. oxygen is released
b. humus is formed in the soil
c. CO_2 in significant amounts is released into the air
d. organic debris is continuously removed from man's environmen
*e. items b, c, and d are all correct

B
6
P .44

Cor.I.39
Cor.X.23

5. The lichen is a plant which exemplifies a symbiotic relationship or mutualism (two organisms benefiting from the presence of each other). Lichens are often seen in our wooded areas as bright yellow green or grey green growths on the shaded side of trees, rocks, etc. Lichens are composed of algae and and thread-like fungi. The photosynthesizing organism would most likely be

*a. the algae
b. the fungi
c. both
d. neither

C 1. A scientist was looking under a microscope at a multicellular substance with flagellated cells. He concluded that it was

1

P .55

•

Cor.I.32 a. a virus

Cor.X.30 b. an animal

c. a mold

d. a flowering plant

*e. not enough evidence given to decide

CHAPTER XII

D
6
P .57

Cor.I.17
Cor.X.15

1. Yeast are to buds as mushrooms are to ________. The best fill would be

   a. gametes
   b. hyphae
   c. zygotes
   d. chloroplasts
   *e. spores

D
2
P .54

Cor.I.14
Cor.X-.03

2. Simple plants are considered to be similar to animals because

   a. they are autotrophic
   *b. they have flagella and movement in reproductive stages
   c. they look like small animals
   d. they are found in fresh and salt water

D
1
P .65

Cor.I.25
Cor.X.14

3. In comparing bacteria and fungi, which of the following would apply to most of the members of each group?

   a. heterotrophic
   b. chemically breakdown organic molecules
   c. valuable to man
   d. have similar growth requirements
   *e. all of the above

CHAPTER XIII

A 1. The oldest algae fossil found may date back to the
1
P .68 a. Cambrian period
b. Devonian period
Cor.I.21 c. Silurian period
Cor.X.03 *d. Pre-Cambrian period

A 2. An organism which produces its own food is said to be
8
P .46 a. heterozygous
b. homologous
Cor.I.26 c. heterotrophic
Cor.X.12 *d. autotrophic

A 3. Which of the following statements is correct?
3
P .48 *a. gamete + gamete → zygote → organism
b. gamete → zygote → organism
Cor.I.49 c. zygote + zygote → gamete → organism
Cor.X.32 d. zygote → gamete → organism

A 4. If intrusive igneous material age dated at 1.6 billion years
9 was found associated with sedimentary material containing
P .43 fossils of early plant life, we know that

Cor.I.06 *a. there were plants in the Pre-Cambrian period
Cor.X.06 b. the sedimentary rock is also 1.6 billion years old
c. there were simple animals in the Pre-Cambrian period
d. the photosynthetic process was acting in the Pre-Cambrian times

A 5. Plants containing chlorophyll illustrate a type of nutrition
6 called
P .49 *a. independent
b. dependent
Cor.I.26 c. parasitism
Cor.X.22 d. saprophytism

A 6. Diatoms
4
P .56 a. are found only on land
b. are found only in fresh water
Cor.I.18 c. are all alike
Cor.X.26 *d. make all their own food

A 7. The age of the earth is most closely estimated at approximately
8
P .82 a. one billion years
*b. five billion years
Cor.I.23 c. three and one-half million years
Cor.X.00 d. one million years

A
8
P .38

8. The portion of the earth's existence which passed before organisms appeared that were capable of leaving fossil traces was

Cor.I.38
Cor.X.21

a. 1/4
b. 1/2
*c. 3/4
d. 1/8

A
8
P .65

9. The first evidence that plants had invaded the land from the sea comes from fossils of the

Cor.I.17
Cor.X.11

a. Permian period
b. Cenozoic era
*c. Cambrian period
d. Paleozoic era
e. Devonian period

A
8
P .39

10. A characteristic which shows more relation of fungi to protozoa rather than algae is that they

Cor.I.25
Cor.X.20

a. are autotrophic
b. have nuclei
c. have thick cell walls
*d. are heterotrophic

A
8
P .61

11. Diatoms are the most abundant organism in the world next to

Cor.I.09
Cor.X.08

a. plankton
b. algae
c. virus
*d. bacteria
e. algin

A
3
P .28

12. Spores differ from the zygote in the life cycle of the Ulva in that the spores have

Cor.I.06
Cor.X.05

a. fewer chromosomes but more nuclei
b. more flagella and more chromosomes
c. less flagella and more chromosomes
d. less flagella and less chromosomes
*e. more flagella and less chromosomes

CHAPTER XIII

B
1
P .32

1. A new vascular plant named Ulloa has been found which reproduces only by mitosis. On the basis of what you have learned which is correct?

Cor.I.11
Cor.X.08

*a. the plant will probably not survive for many generations because of the inability to genetically recombine genes
b. the plant will flourish because of its simple life cycle
c. environmental changes will not have any effect upon the plant's survival rate
d. none of the above is right

B
3
P .25

2. Spirogyra, an algae, has a nucleus which contains 16 chromosomes. This is the monoploid or 1n number. After the zygote is formed, there are 32 chromosomes. This is the diploid or 2n number. When is the Spirogyra in the gametophyte stage?

Cor.I.25
Cor.X.17

a. budding
b. 32
*c. meiosis
d. mitosis
e. 16

B
3
P .24

3. What reproductive process takes place in the developing sporophyte stage?

Cor.I.13
Cor.X.15

a. budding
b. gametes
*c. meiosis
d. mitosis
e. fertilization
?

B
9
P .66

4. A house wife was shopping for a cleanser to use to clean her sink. She read the labels on different products and found that A contained twice as much diatomaceous earth as B. She correctly decided that

Cor.I.14
Cor.X.08

*a. B would not scour the sink as well as A
b. A would be better to polish glass
c. B would be better to use to scour frying pans
d. B would clean the sink better

B
6
P .82

5. A laboratory technician observed two colonial autotrophs, A and B, under a microscope. He noticed that A showed certain cells to be potentially reproductive. He could conclude that

Cor.I.15
Cor.X.16

a. A had no division of labor
b. B had some division of labor
c. A more closely approximated a multicellular organisation
*d. B more closely approximated a multicellular organization

B
9
P .35

Cor.I.08
Cor.X.21

6. What will be the percentage of lead and percentage of uranium in a rock after a period of eighteen billion years?

a. 100 per cent uranium, 0 per cent lead
b. 50 per cent uranium, 50 per cent lead
*c. 5 per cent uranium, 95 per cent lead
d. 0 per cent uranium, 100 per cent lead

B
9
P .37

Cor.I.29
Cor.X.18

7. If a newly found species of plant produces both male and female gametes and then later produces spores - but both the gameetophyte stage and sporophyte stage look similar, then - on this basis one could say

a. this is a Sporo-Gamo plant
b. no such plant exists
*c. the life cycle of this plant is similar to Ulva
d. the life cycle of this plant is similar to ferns

B
9
P .33

Cor.I-.01
Cor.X-.06

8. If a spore, after germination, developed into a plant on which no spores could be located - one could say

a. this plant does not have any means of reproducing, because it does not have spores
b. it is evident that this plant must have male and female gametes
c. this plant is a non-reproductive mutant
*d. more information is needed to form a conclusion

B
1
P .55

Cor.I.27
Cor.X.13

9. Many forms of plant life evolved onto land because

a. support is easier on land than in water
b. absorption of CO_2 is easier in the air than in water
c. reproduction is simpler on land than in water
*d. there is less competition on land

B
8
P .70

Cor.I.36
Cor.X.19

10. Which does not fit in the following group?

*a. protozoa
b. spore
c. zygote
d. gametophyte
e. gametes

CHAPTER XIII

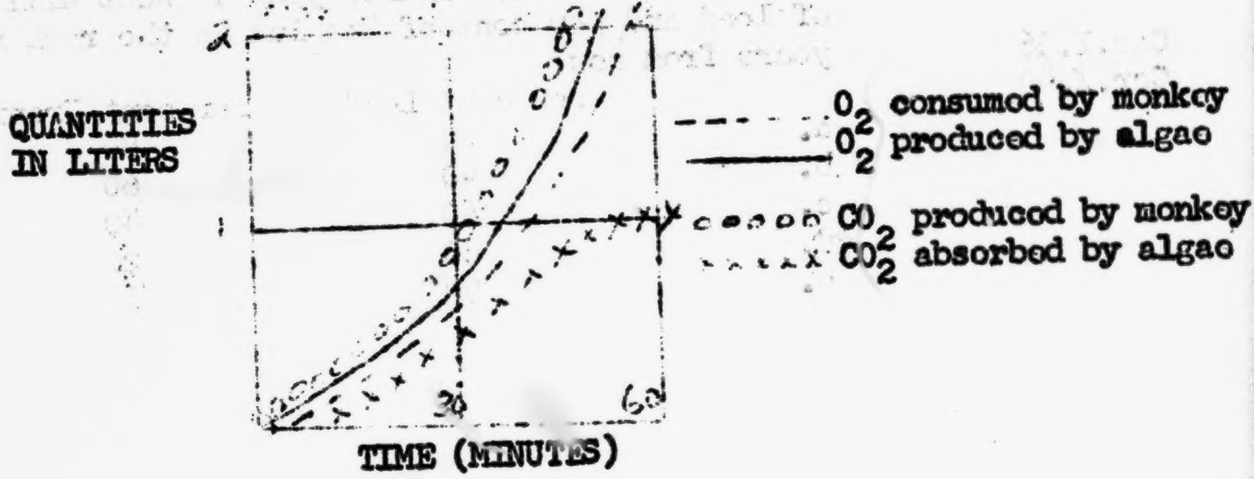
C
9
P .35
Cor.I.22
Cor.X.09

1. A biologist was studying two different types of unicellular organisms which he labeled A and B. Specimen A was found to have a cell wall, a nucleus, chlorophyll b only, and exhibited heterogamy, specimen B was found to possess a cell wall, a nucleus, chlorophyll a and b, and exhibited isogamy. On the basis of the evidence given, which specimen would probably be most closely related to the multicellular green plants of today?

   *a. specimen A
   b. specimen B
   c. either specimen A or B
   d. not enough information given to form a conclusion

C
9
P .48
Cor.I.13
Cor.X.11

2. A cebus monkey was placed in a closed system which contained 55 liters of algae suspension and an air space of 230 liters. From the following data, what could you conclude if the experiment was to continue? After an hour of experimentation, the 02 content increased up to 25 per cent, while the CO_2 content did not exceed 1 per cent.



From the above you could conclude that

a. the O_2 content would continue to increase
b. the monkey would become hyperventilated
c. the CO_2 - O_2 ratio would reach an imbalance
*d. all of these
e. none of these

CHAPTER XIII

D
3
P .86

Cor.I.25
Cor.X.30

1. What is the significance of the role in insects in plant development?
   - a. insects get a source of food
   - b. some insects have a place to rear young
   - c. some plant pests are controlled by some insects who feed on them
   - *d. gametes of one plant are transferred to the gametes of another

D
1
P .69

Cor.I.13
Cor.X.13

2. What is the significance of the relationship of the discovery of blue-green algae cells dating back to an early geologic period to the plants of today?
   - *a. they represent evolutionary predecessors of heterotrophic organisms
   - b. they represent a hithertofore unknown type of chlorophyll
   - c. they are the biggest fossil finds known
   - d. they have unusually large and highly developed cells.

D
9
P .31

Cor.I.36
Cor.X.40

3. A rock specimen was found to contain approximately 20 per cent lead 206 and 80 per cent Uranium 238. The half life of Uranium 238 is 4.5 billion years. What will be the per cent of lead and per cent of Uranium in the rock nine billion years from now?

	Per cent Lead	Per cent Uranium
a.	20	80
b.	40	60
c.	60	40
*d.	80	20
e.	90	10

CHAPTER XIV

A
6
P .56
Cor.I.41
Cor.X.31

1. According to the text, the most primitive vascular plants contained only one of the following

   a. roots
   b. leaves
   *c. stems
   d. seeds

A
6
P .31
Cor.I.24
Cor.X.08

2. Which of the following seems to be a trend in development of higher plants?

   *a. decreasing dominance of the gametophyte generation
   b. decreasing need for photosynthesis
   c. decreasing dominance of the sporophyte generation
   d. decreasing need for photosynthesis

A
6
P .62
Cor.I.34
Cor.X.09

3. Which of the following developments is considered most important in allowing the mosses to acquire sufficient water for life on land?

   a. development of spores
   *b. development of root-like rhyzoids
   c. development of true roots
   d. development of hyphae

A
3
P .09
Cor.I.13
Cor.X.14

4. Which statement is most true of all plants?

   a. produce gametes by isogamy or heterogamy
   *b. produce spores at some stage in life cycle
   c. contain chlorophyll and carry out photosynthesis
   d. exhibit alternation of generation

A
3
P .14
Cor.I.05
Cor.X.11

5. Seed plants, such as pines, have both male and female gametophytes. Gametophytes develop from spores. Therefore, if you follow this line of reasoning, we have just described a condition known as

   a. isogamy
   b. heterogamy
   c. isospory
   *d. heterospory

A
6
P .54
Cor.I.27
Cor.X.20

6. The gametophyte is very reduced in seed plants. What is the male gametophyte in these plants?

   a. a spore
   b. a sporangium
   *c. a pollen grain
   d. an ovule

A
3
P .27

Cor.I.48
Cor.X.25

7. Which process begins or initiates the monoploid (N) condition

a. mitosis
*b. meiosis
c. fertilization
d. embryo development

A
3
P .73

Cor.I.10
Cor.X.12

8. The principle advantage to plants of cross-pollination is

a. pollination is more certain
*b. this allows for genetical recombination of offspring
c. this tends to keep the type of offspring more uniform
d. it gives the bees something useful to do

A
6
P .40

Cor.I.39
Cor.X.11

9. Pollen grains are produced by the

a. stigma
b. style
*c. anther
d. ovary

A
6
P .74

Cor.I.26
Cor.X.05

10. A peach is the result of an enlargement of which part of the flower?

a. pistil
b. stamen
*c. ovary
d. stigma

A
4
P .55

Cor.I.40
Cor.X.35

11. Of what significance to the reproduction of the species is the fact that liverworts must live in a moist area?

a. the plant would dry up
b. because all liverworts are aquatic
*c. the sperm requires a film of water
d. seeds need moisture to germinate

A
8
P .40

Cor.I.17
Cor.X.07

12. The essential evolutionary steps in the development of the seed required all but one of the following

a. introduction of heterospory
*b. introduction of isogamy
c. formation of integuments around the sporangia
d. retention of female spores in the sporangium

A
8
P .42

Cor.I.15
Cor.X.12

13. The gametophyte generation of the seed plants is

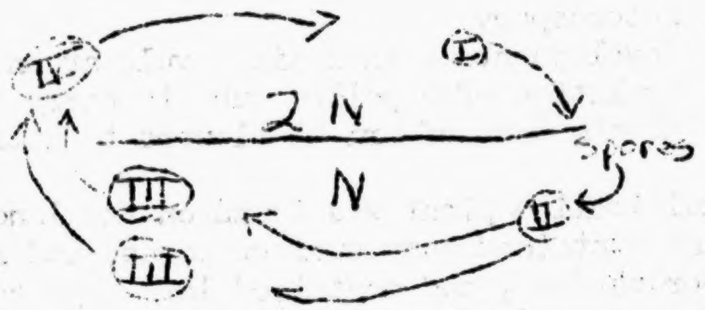
a. dominant over the sporophyte
*b. dependent on the sporophyte
c. occurs as a separate plant form
d. is photosynthetic

A
6
P .77
[illegible]
Cor.I.43
Cor.X.16

14. A waxlike substance that assists in reducing the rate of evaporation from surface cells of plants is

*a. cutin
b. parafin
c. rhizoids
d. cytoplasm

The diagram below illustrates the life cycle of a plant exhibiting alternation of generation.



A
3
P .18
[illegible]
Cor.I.25
Cor.X.24

15. Which number indicated the sporophyte generation?

*a. I
b. II
c. III
d. IV

A
3
P .60
[illegible]
Cor.I.32
Cor.X.12

16. Which number indicates the zygote?

a. I
b. II
c. III
*d. IV

CHAPTER XIV

B
4
P .48

Cor.I.21
Cor.X.28

1. In a dry climate , ferns usually cannot go through an entire life cycle. Usually, the stage that cannot be found is the

a. spore
b. sporophyte
c. sporangia
d. rhizome
*e. gametophyte

B
6
P .47

Cor.I.01
Cor.X-.10

2. Which of the following do you consider the most important in releasing the need for vascular plants for free water in fertilization?

a. heterospory
b. development of enclosing ovule around the egg
*c. evolution of a pollen tube to carry a sperm
d. development of bright flowers to attract insects

B
4
P .26

Cor.I.25
Cor.X.19

3. A multicelled plant was found on the land near the sea. The plant contained many surface pores, had rhizoids upon its under surface, and contained large egg cells confined to a female reproductive organ. A cross section cut showed no veins. Which is probably true?

a. the plant really was a marine plant which washed up on shore
*b. the plant was a land plant which apparently grows near the ocean
c. the plant was a vascular plant which was growing near the sea
d. some other explanation is needed to explain the presence of the plant

B
8
P .30

Cor.I.13
Cor.X.05

4. What is the significance of heterogamy to survival of the sporophyte?

*a. more food can be stored
b. the sperm is stronger than the egg
c. the gametes can move further and faster
d. the egg is in a more favorable place for further growth

B
4
P .64

Cor.I.17
Cor.X.25

5. A probable succession of plant life on exposed rock is

a. ferns, annuals, lichens, moss
b. annuals, moss, lichens, ferns
c. lichens, ferns, moss, annuals
*d. lichens, moss, fern, annual

B
1
P .58
Cor.I.20
Cor.X.09

6. The significance of embryo formation in the colonization of land by green plants is

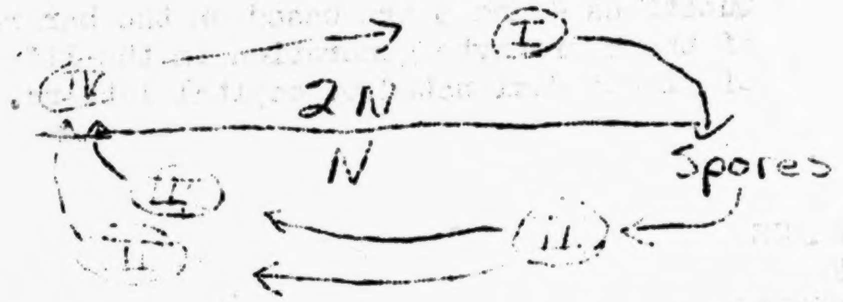
a. that once an embryo is formed it is no longer subject to mechanical injury
*b. that in terrestrial plants the embryos develop inside the protective covering of the female reproductive structure
c. that once an embryo is formed there is no apparent need for protection of the embryo from the elements of the environment
d. none of the above

B
6
P .31
Cor.I.03
Cor.X.09

7. If you found a plant with flagellated gametes and cutin on the outer surface, you would assume that it grew

a. in the ocean
*b. in swampy areas
c. in the desert
d. anywhere on land

The diagram below illustrates the life cycle of a plant exhibiting alternation of generation.



B
3
P .34
Cor.I.12
Cor.X.03

8. If you were told that stage I is attached and dependent of stage II, this would best illustrate the life cycle of

*a. a moss
b. a fern
c. a gymnosperm
d. an angiosperm

B
3
P .16
Cor.I.00
Cor.X-.15

9. If both I and II are separate independent plants when mature, this would best illustrate the life cycle of a

a. liverwort
*b. fern
c. pine tree
d. flowering plant

C
8
P .74

Cor.I.18
Cor.X.05

1. Which of the following would not stop self-pollination in a self-pollinated plant?

   a. cover the stamen
   b. cover the pistil
   c. remove the anther
   *d. remove the petals

C
6
P .70

Cor.I.20
Cor.X.05

2. If a plant is to grow at least 20 feet tall in a dry environment it would have

   a. rhizoids and a vascular system
   b. roots and flagellated gametes
   *c. vascular system and roots
   d. rhizoids and cutin

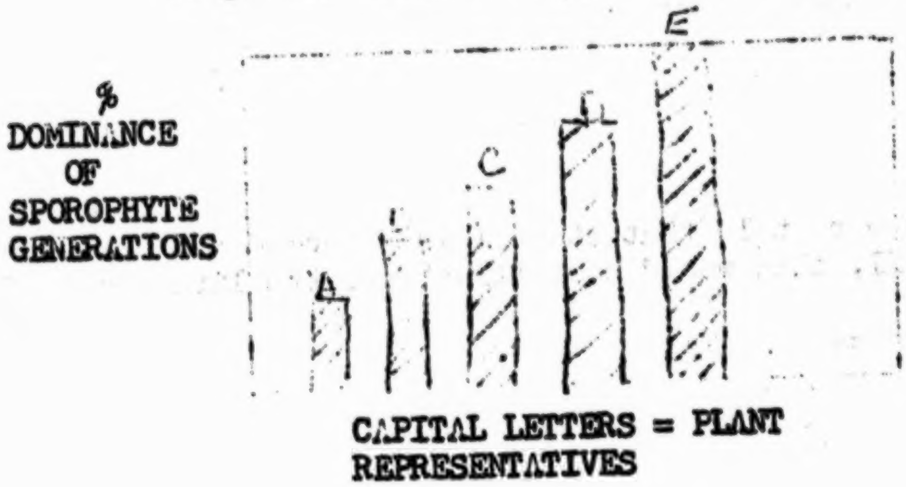
C
8
P .54

Cor.I.17
Cor.X-.03

3. To insure cross-pollination of a flower

   *a. the stamen must be produced by a different flower than the pistil
   b. the flowers must be dull in color
   c. the pollen must not be sticky
   d. the stamen must mature at the same time

Questions 4 and 5 are based on the bargraph showing dominance of the sporophyte generation in the life cycle of various types of plants designated by capital letters.



C
9
P .28

Cor.I.10
Cor.X.15

4. The plant at D is most likely a

   a. rose
   b. moss
   *c. fern
   d. pine

C
9
P .22

Cor.I.15
Cor.X.07

5. The plant represented at B is probably

   *a. moss
   b. fern
   c. pine
   d. tulip

CHAPTER XIV

D
4
P .17
Cor.I.07
Cor.X.10

1. In a portion of the arid Southwest it is found that the number of Pronuba Moth was increasing and the number of Yucca was slowly decreasing. As a result of this a biologist might think

a. Pronuba would continue to increase
b. Yucca would continue to decrease
*c. given enough time, Pronuba would tend to decrease
d. Yucca seeds were being destroyed by the Pronuba

D
6
P .43
Cor.I.22
Cor.X.09

2. In correlating structure with function in vascular plants which of the following has made possible the growth of very tall redwood trees of large size?

a. the presence of phloem tissues for condition of food from the leaves to the roots and other storage tissues in the redwood tree
*b. the presence of xylem tissues for the rapid movement of water and for support of above ground portions of the plant body
c. the presence of photosynthetic tissues in the needle-like leaves of the redwood trees
d. none of the above

D
1
P .50
Cor.I.16
Co5.X.10

3. If a mutation in a flowering plant caused the pollen tube not to germinate

a. the pollen grain would become flagellated and swim to the egg
*b. the plant would become extinct since fertilization would be impossible
c. insects would carry the pollen to the egg
d. water on the plants would carry the pollen to the egg

D
1
P .36
Cor.I.39
Cor.X.12

4. Which of the following reasons was probably least significant during the evolution of plants from a water to land environment?

a. rhizoids and roots were developed to obtain water
b. multicellularity exposed less surface to the environment
c. cutin layer reduced water loss
*d. the prominence of the gametophyte stage

CHAPTER XV

A 1. Palisade cells are found in
8
P .66 a. stem
*b. leaf
.
Cor.I.39 c. roots
Cor.X.30 d. branch
e. trunk

A 2. Plants and animals are alike in that they both
2
P .79 a. move around in search for food
*b. store energy in the form of ATP
Cor.I.39 c. can produce their own food from inorganic substances
Cor.X.30 d. require identical living conditions

A 3. Which one of the following is not a way that plants and animals are similar?
2
P .73
a. both have cells
Cor.I.40 b. both grow and reproduce
Cor.X.22 c. both show movement in response to stimuli
d. both need ATP for energy
*e. both can synthesize glucose from CO_2 and inorganic molecules

A 4. Carnivores eat only flesh. The energy released by respiration within their cells was originally derived from
4
P .52
*a. the sun
Cor.I.18 b. a plant
Cor.X.10 c. eaten flesh
d. their own cells

A 5. The upper layer of cells in the interior of a leaf is called the
8
P .57
M 24.56 *a. palisade layer
b. spongy layer
Cor.X.30 c. xylem layer
d. phloem layer

A 6. Photosynthesis depends mostly upon which part of the light spectrum?
8
P .67
*a. red
Cor.I.30 b. blue
Cor.X.20 c. green
d. orange

A 7. The process of building glucose molecules in plants
8
P .38 *a. is the opposite of respiration in animals
. b. requires water taken in through the leaves
Cor.I.34 c. occurs in both plants and small animals
Cor.X.33 d. takes the place of respiration in plants

A
8
P .58

Cor.I.27
Cor.X.36

8. A green plant appears green because

a. green light is transmitted
b. green light is absorbed
*c. all colors except green are absorbed
d. all colors except green are reflected
e. all colors are reflected equally

A
8
P .31

Cor.I.33
Cor.X.01

9. As a result of photosynthesis, oxygen is given off by the green plant. This oxygen comes from

a. CO_2
*b. H_2O
c. $C_6H_{12}O_6$
d. none of the above

A
6
P .60

Cor.I-.02
Cor.X-.06

10. Which of the following structures of a green plant is not necessary for photosynthesis?

a. petiole
b. cambium
c. cortex
d. epidermis
*e. all of the above

A
6
P .49

Cor.I.23
Cor.X.23

11. An end product of photosynthesis is

*a. glucose
b. glycogen
c. starch
d. any carbohydrate
e. carbon dioxide

A
8
P .80

Cor.X.38
Cor.X.08

12. The structure which holds the blade of a leaf to the stem is called a

a. rhizome
*b. petiole
c. branch
d, stipule

8
P .32

Cor.I.52
Cor.X.40

13. What is the name of the structures containing chlorophyll?

*a, grana
b. plates
c, stomata
d. phototherms

A
6
P .38
Cor.I.34
Cor.X.30

14. The leaf is the chief photosynthetic structure of the green plant. All cells of the leaf have chlorophyll except

a. palisade cells
b. guard cells
c. spongy cells
*d. epidermal cells

A
8
P .30
Cor.I.36
Cor.X.20

15. The continuation of the petiole into the blade of the leaf is called the

a. vein
b. stem
c. cotyledon
*d. midrib
e. epicotyl

A
8
P .34
Cor.I.45
Cor.X.29

16. Chlorophyll is closely related to hemoglobin in our blood. The main difference is that the chlorophyll molecule has ____________ instead of iron

a. carbon
b. hydrogen
c. oxygen
d. nitrogen
*e. magnesium

A
6
P .46
Cor.I.27
Cor.X.10

17. The loss of water by a green plant is controlled mainly by

*a. guard cells
b. palisade cells
c. epidermal cells
d. spongy layer cells

CHAPTER XV

B
6
P .26

Cor.I-.11
Cor.X-.02

1. When water enters the guard cells they open and when water leaves the guard cells they close. The changes in water content of the guard cells are in many cases related to changes in sugar content. Select the following correct statement

 a. if the sugar content of the guard cells is high, water leaves the guard cells and the stoma closes
*b. if the sugar content of the guard cells is high, water will move into the guard cells causing the stoma to open
 c. if the sugar content of the guard cells is low, the water will enter the guard cells and the stoma will open
 d. if the sugar content of the guard cells is low, the water will leave the guard cells and the stoma will open

B
4
P .41

Cor.I.31
Cor.X.20

2. If a botanist wished to speed up the rate of photosynthesis in a green plant, he would not use green light because

 a. green light is the same color as chlorophyll
 b. green light is both reflected and transmitted by the green leaf
*c. the botanist would want to use the part of the visual spectrum which is absorbed
 d. the ultraviolet light provides the greatest source of energy to drive the photosynthetic process

B
8
P .30

Cor.I.12
Cor.X-.07

3. Photosynthesis is said to be a link between

*a. living and non-living
 b. plant and animal
 c. water and air
 d. sun and CO_2

B
4
P .83

Cor.I.06
Cor.X.04

4. Let us say that green plants have been detected on Mars. Which of the following could we predict?

 a. temperatures usually below freezing
 b. great amounts of helium in the air
 c. temperatures probably above 60°F
*d. an atmosphere containing oxygen

B
8
P .22

Cor.I.21
Cor.X.15

5. In the whole series of photosynthetic reactions, several materials and substances are changed from one form to another and eventually back to the original form. They are not used up in the over-all process. This is true of all, except which one of the following?

 a. TPN
 b. ADP
 c. chlorophyll
*d. CO_2
 e. H_2O

B
8
P .12

Cor.I-.05
Cor.X.01

6. The only biochemical process of any great consequence that provides a net gain in chemical energy is

a. meiosis
b. diffusion
*c. respiration
d. photosynthesis
e. digestion

B
4
P .60

Cor.I.37
Cor.X.33

7. The rate of photosynthesis may depend on the amount of

a. moisture in the air
b. boron in the air
*c. carbon dioxide in the air
d. carbon dioxide in the soil
e. all of these

B
4
P .43

Cor.I.15
Cor.X.12

8. In view of the function of a leaf, one would expect usually to find leaf oriented so that

a. the side on which the midrib is, is toward the sun
b. its smooth flat side is parallel to the sun's rays
*c. its smooth flat side is perpendicular to the suns rays
d. the midrib is perpendicular to the ground
e. the midrib points to the sun

B
4
P .74

Cor.I.21
Cor.X,23

9. Green leaves kept in the dark for several days are tested for starch, and no starch is found. This observation could best be accounted for by the hypothesis that

a. the plant stored all its starch in its roots
b. the chlorophyll had been used by the plant for food
*c. light is necessary for starch production
d. the starch has all turned to sugar

B
8
P .77

Cor.I.37
Cor.X.21

10. Which of the following is not necessary in photosynthesis?

a. chlorophyll
*b. green light
c. red light
d. water

B
8
P .66

Cor.I.31
Cor.X.14

11. Carbon dioxide is to respiration as __________ is to photosynthes

a. carbon dioxide
*b. oxygen
c. water
d. nitrogen

B
6
P .50

Cor.I.47
Cor.X.45

12. If all green plants disappear, which of the following substances normally found in the atmosphere would probably disappear first?

a. CO_2
b. N_2
c. H_2O vapor
*d. O_2
e. none of the above

B
7
P .13

Cor.I-.11
Cor.X-.11

13. Assuming that a single-celled green plant is in a bright light, which of the following best explains the advantage of rapid conversion of the sugar to insoluable starch? (Assume the cell membrane to be relatively impermeable to sugar)

a. starch can be used more readily by the cell than sugar
b. the sugar would diffuse out of the cell if it were not converted to starch
*c. the cell would swell and might burst if the sugar were not converted to starch
d. the starch takes up less room in the cell
e. none of the above are logical explanations

B
6
P .74

Cor.I.26
Cor.X.10

14. The water content of guard cells first affect photosynthesis by

a. cutting down on the light
b. drying up the chloroplasts in the other leaf cells
*c. closing stomata
d. allowing too much light to enter

B
6
P .35

Cor.I.16
Cor.X.09

15. A leaf of a tree may be likened to a flake of soap for reasons that the leaf

a. permits water to enter the stomata as water enters the thin soap flake
*b. permits an increased exposed surface to better perform its function
c. washes off easily because of the cutin (waxy substance)
d. contains spongy cells

CHAPTER XV

C
4
P .39

Cor.I.06
Cor.X-.02

1. When one molecule of sugar is produced in photosynthesis, six molecules of water and six molecules of carbon dioxide are utilized. The molecular weight of water is 18, while the molecular wieght of carbon dioxide is 44. On the basis of this information, which one of the following conclusions is most acceptable?

   a. the greater bulk(weight) of material which goes to make up the wood in a tree is obtained by the tree from the soil
   *b. the greater bulk of material which goes to make up the wood in a tree is obtained by the tree from the air
   c. plants absorb nearly all of their food from the soil
   d. water and CO_2 have no relationship to the structure of the wood

C
4
P .40

Cor.I-.01
Cor.X-.10

2. If you observed the cells of leaves from two different plants and found that plant A, had more stomata on the upper epidermis than on the lower epidermis, and that plant B, had more stomata on the lower epidermis than on the upper epidermis, you might expect that

   a. plant A usually grows in an arid, dry environment
   b. plant B must have come from a location that would be considered as a wet environment
   *c. plant A is most likely a water plant that has some of its parts submerged most of the time
   d. plant A must grow better than plant B

C
9
P .39

Cor.I.18
Cor.X.29

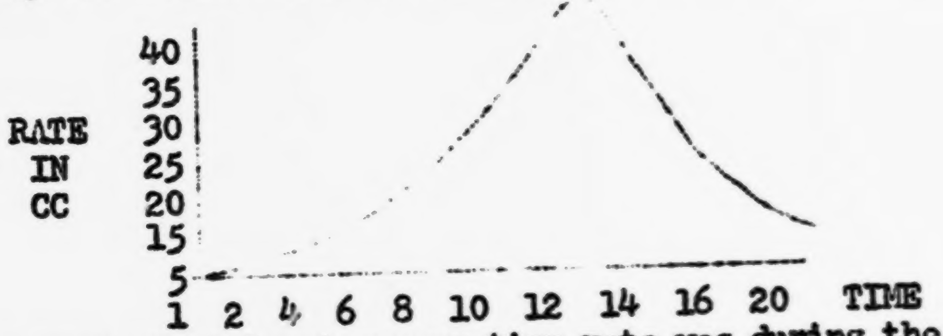
3. In order to test the importance of stomata in the regulation of CO_2 intake, an experiment was performed whereby the photosynthetic ability could be measured in a number of leaves of a plant. To cover the stomata, vaseline was put on the epidermis of a few of the leaves. Which of the following is not a correct conclusion to this experiment?

   a. a negative result for starchy presence indicates that photosynthesis did not take place
   b. the leaves covered with vaseline died
   c. a negative test for sugar
   *d. the leaves continued to photosynthesize

C
4
P .65

Cor.I.34
Cor.X.21

4. Study the following graph showing the rate of plant evaporation



The most signigicant evaporation rate was during the hours

   *a. 12-14
   b. 4-6
   c. 8-10
   d. 14-16

CHAPTER XV

D
6
P .44
Cor.I.33
Cor.X.29

1. A leaf appears green when illuminated with sunlight. Which of the following statements explain this phenomenon best?

   a. sunlight is composed principally of wavelengths in the green area of the spectrum
   b. leaves absorb most light in the green area of the spectrum
   c. all wavelength of light except green are transmitted through the leaf
   *d. leaves reflect most light in the green area of spectrum

D
6
P .65
Cor.I.30
Cor.X.30

2. It has been said that all the free oxygen of our atmosphere has been produced by green plants. The parts of the light spectrum which enable the green plants to produce oxygen in large quantities are the light waves which fall into the

   a. violet and green range
   b. green range mainly
   c. green and red range
   *d. violet and red range

CHAPTER XVI

A
8
P .69

Cor.I.36
Cor.X.26

1. A plant has leaves with parallel veins and a flower with three petals and three sepals. The plant probably was

*a. stems with scattered vascular bundles
b. stems with vascular bundles in a ring
c. seeds with two cotyledons
d. a fleshy taproot

A
8
P .69

Cor.I.36
Cor.X.27

2. Which of the following is not a characteristic of a monocot plant?

a. leaves with parallel veins
b. flower parts in three's or multiples of three
c. one cotyledon
*d. stems with vascular cambium and with vascular bundles in a ring

A
3
P .56

Cor.I.26
Cor.X.23

3. Probably the most important advantage of vegetative propogation is

a. the new plants will grow more rapidly
*b. the new plants will be genetically identical with the parent
c. the new plant will be one phase of alternation of generation
d. the new plant will have greater variation and adaptive characters
e. the new plant will live longer

A
6
P .32

Cor.I.11
Cor.X.21

4. Which of the following cannot be found in a vascular bundle?

a. xylem
b. phloem
c. cap cells
*d. cortex
e. cambium

A
6
P .55

Cor.I.11
Cor.X.01

5. Sugar solutions move from leaf to root via the phloem cells which together make up

*a. sieve tubes
b. tracheids
c. pit cells
d. companion cells
e. cambium

A
4
P .21

Cor.I.29
Cor.X.21

6. Green plants absorb ________ from the soil

a. proteins
b. carbohydrates
*c. oxygen
d. carbon dioxide

A 7. The process in which green plants use nitrogen is
6
P .31

a. photosynthesis
*b. proteinsynthesis
Cor.I.13 c. respiration
Cor.X.16 d. digestion

CHAPTER XVI

B
9
P .63

1. A nail is driven into a young 10 ft. sapling exactly five feet from the ground. Many years pass and the yound tree is now a sturdy tree 20 ft. tall. The nail is now

Cor.I.14
Cor.X.17

a. sixteen feet from the ground
b. fourteen feet from the ground
*c. five feet from the ground
d. ten feet from the ground

B
6
P .23

2. If algae grow on the terrestrial environment they would be prostrate in growth habit, because

Cor.I.14
Cor.X.03

a. they have no tropisms
b. auxins are not found in their tissue
*c. the stipe lacks sufficient supportive material
d. none of the above are correct

B
9
P .35

3. The entire inside area of a tree was burned but it is still green and apparently alive. Which is probably not the reason for the tree's continued life?

Cor.I.13
Cor.X-.02

*a. a tree has the ability to regenerate all tissues as long as the bark is not killed
b. the pith is not essential to the tree's existence
c. the cambium layer was not damaged by the fire
d. the xylem and phloem were not damaged by the fire so food and water could still be transported

B
6
P .87

4. It would be impossible for algae to be tall, land plants because

Cor.I.16
Cor.X.19

a. they are so small in size
b. they are all non-green plants
*c. they do not have true stems, roots and leaves
d. they do not have the ability to store food
e. only a and b

B
9
P .65

5. If you tied a bell on a branch four feet off the ground on a 10 foot tree, how long a ladder would you need to reach the bell when the tree is 50 feet tall?

Cor.I.12
Cor.X.10

a. 12 feet
*b. no ladder needed
c. 50 feet
d. 46 feet
e. 40 feet

B
6
P .17

6. The stems of aquatic plants are usually soft and weak. The best reason for that is the fact that

Cor.I-.06
Cor.X-.21

a. most of the stems are short
*b. stems contain only a few vascular bundles
c. turgidity is greater because of water supply
d. water helps support the leaves and stem
e. phototropism is greater because there is a reflection from water

B
4
P .26

Cor.I.10
Cor.X.19

7. I went through a large glass door into an office building yesterday. There were plants by the wall next to the door, and the entry was lighted artificially at night by a very small bulb. As might be expected the plants were growing

a. toward the light
*b. toward the door
c. toward the wall
d. toward the entry

CHAPTER XVI

C
9
P .43

Cor.I.06
Cor.X.01

1. If someone brought you a plant that seemed to lack root hairs, you might say

   a. this plant grows in very soft soil
   b. this is a dry climatic adaptation
   *c. this plant must have grown in very moist soil
   d. none of the above

C
5
P .77

Cor.I.22
Cor.X.14

2. If a young plant (10 inches tall) growing in a pot, were turned upsidedown, and left suspended in this position for several weeks

   a. the plant would die
   b. the upper surface of the leaves would remain faced toward the floor of the green house, as they were when the plant was turned over
   *c. the stem of the plant would begin to turn upward
   d. the leaves of the plant would drop off because sunlight would no longer strike their upper surface as it did before

C
4
P .83

Cor.I-.01
Cor.X.10

3. When a tree stump was dug out of the ground, all the main roots were on one side of the stump. This condition was probably caused by

   a. the ground being too hard on one side
   b. the main roots being placed on one side when the tree was planted
   c. roots responding to the strong winds blowing on the opposite side
   *d. roots seeking a supply of water

C
7
P .53

Cor.I.06
Cor.X-.02

4. A heavy application of fertilizer on a lawn will cause the grass to die. This may be caused by

   a. the death of the root hairs
   b. loss of water from the leaves
   c. water diffusing out of the roots
   *d. chemicals burn the tissues of the leaves
   e. none of the above answers the question

D
6
P .65

Cor.I.33
Cor.X.13

1. I went for a hike through part of the state of California. Most of the vegetation had thick fleshy stems, few or no leaves, and one I dug up had an extensive root system. You should know from this that the climate was

*a. dry
b. humid
c. hot
d. wet
e. cold

D
6
P .55

Cor.I.31
Cor.X.28

2. The relationship between carbon dioxide and stomates is comparable to the relationship between water and which one of the following?

a. glucose
b. osmosis
*c. root hairs
d. cellular
e. xylem

D
6
P .30

Cor.I.13
Cor.X.10

3. If a growth hormone caused a plant to grow at an extremely rapid rate the plant would

*a. grow to the maximum height allowed by its vascular system
b. die because all of its food would be used up with rapid oxidation
c. not be able to get enough water to its leaves
d. flower early

D
4
P .50

Cor.I.12
Cor.X.01

4. If an oversupply of radiation in the atmosphere caused all nitrifying bacteria to mutate to denitrifying bacteria, we might expect

*a. that the soil would loose its nitrates
b. that amino acids would degenerate
c. that all legumes would die
d. that lal legumes would grow more rapidly

CHAPTER XVII

A
4
P .76

Cor.I.32
Cor.X.24

1. A seed begins to germinate on a piece of moist paper towel and grows into a seedling. The growth observed to this stage is due to energy liberated

   a. from photosynthetic products produced by the seed
   b. from substances in the moist paper
   *c. from the food reserve inside the seed
   d. from the hypocotyl

A
4
P .68

Cor.I.24
Cor.X.11

2. If a seed began to grow and you then turned it upsidedown

   a. the root would grow parallel to the soil surface
   *b. the stem would grow upward away from the force of gravity
   c. the stem would reverse directions with the root and grow downward
   d. the plant would die

A
6
P .65

Cor.I.30
Cor.X.23

3. The male portion of the flower with its product is

   *a. stamen and pollen
   b. anther and filament
   c. pistil and ovum
   d. stigma and ovary

A
8
P .53

Cor.I.33
Cor.X.30

4. A new plant has been cultivated. It has nine petals, parallel venation and a cross-section of the stem shows vascular bundles. You can be sure this plant is

   a. dicotyledonous
   b. a marine plant
   *c. monocotyledonous
   d. none of these

A
6
P .83

Cor.I.35
Cor.X.35

5. The mature fruit is what part of the flower?

   a. style
   b. anther
   *c. ovary
   d. sepal
   e. stamen

A
8
P .48

Cor.I.07
Cor.X.08

6. Which of the following would not separate monocots from dicots?

   a. leaf veination
   b. number of flower parts
   c. presence or absence of vascular cambium in the stem
   *d. seed size

A
6
P .68

Cor.I.32
Cor.X.18

7. You realize that a seed will germinate if the proper conditions are provided. Where does the seed get its energy to grow?

   a. from the sunlight that filters through the soil
   b. from the primary photosynthetic leaves
   *c. from food stored in the seed
   d. from water in the soil

CHAPTER XVII

B
3
P .33
Cor.I.08
Cor.X.05

1. A farmer finds that the seed from his crop gives a very low rate of germination and takes two full seasons to mature, however he finds that we can propogate new plants vegetatively by planting eyes from the tubers of the plants. The new crop will be

   a. less likely to survive since they are product of asexual reproduction
   *b. genetically more like the parents than seed plants would be
   c. genetically exactly like the parent plants
   d. stronger than the parent plants

B
8
P .41
Cor.I.10
Cor.X.02

2. Which of the following would be an example of vegetative propogation?

   a. artificially transferring pollen from stamen of one flower to the pistil of another
   *b. grafting a branch of an orange tree into a grapefruit tree
   c. conjugation
   d. self-pollination

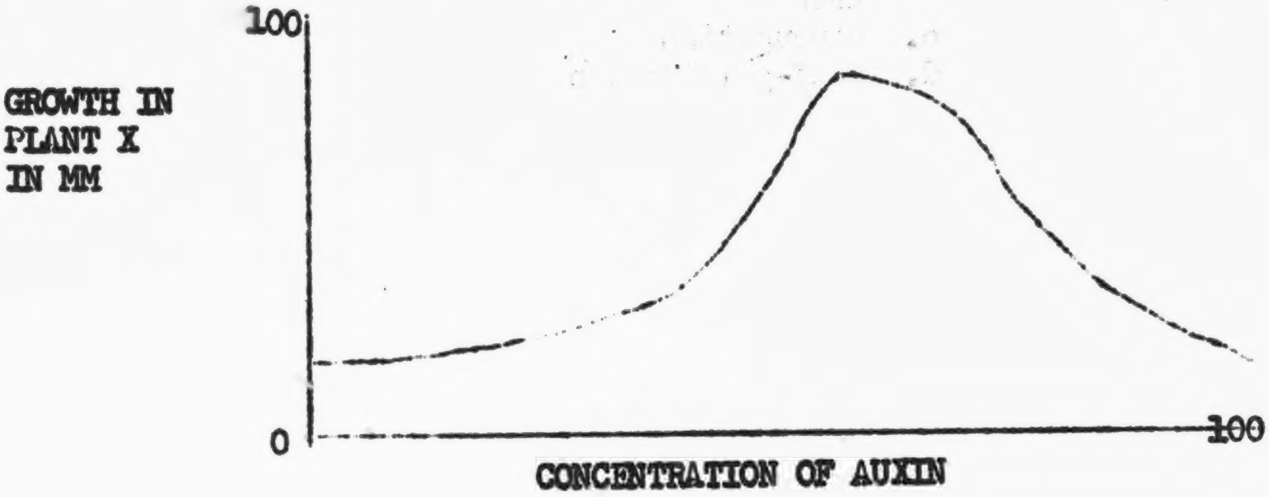
C
5
P .75

Cor.I.25
Cor.X.17

1. A man was allergic to bee stings. He decided to go to a small island and have it sprayed with a non-selective insecticide that would kill all insect life. Since he loved flowers he took some flower seeds with him to start a garden. Two years later he was visited by some friends who were amased to find no flowers. From the information given we may assume that

   a. the flower seeds were of the self-pollinating variety
   *b. the flower seeds were of the cross-pollinating variety
   c. there was not sufficient rainfall
   d. no assumption can be made

Questions 2 and 3 are based on the following graph which shows the relationship between growth rate of a shoot and plant X and auxin concentration



C
4
P .33

Cor.I.15
Cor.X.16

2. The graph indicates that

   a. auzin only inhibits the growth of Plant X
   b. auxin only stimulates the growth of Plant X
   *c. there is an optimal concentration of auxin for the growth of Plant X
   d. the rate of growth of plant X increases as the concentration of auxin is increased at all concentrations
   e. only b and d explain the whole story

C
4
P .61

Cor.I.11
Cor.X.03

3. One would expect the greatest elongation of cells if the auxin concentration were

   a. near 0
   b. near 100
   c. in the middle of the range
   d. near the 75 range

CHAPTER XVIII

A
6
P .90

Cor.I-.21
Cor.X.02

1. Man's success as an animal is due to

a. his ability to fight
b. hig upright position
*c. his ability to think
d. his ability to endure hardships

A
4
P .10

Cor.I-.04
Cor.X-.07

2. An animal community is made up of members which

a. are closely related to each other by evolutionary development
b. are closely related to each other by environmental requirements
c. have succeeded in killing off their competitors
*d. have similar nutritional requirements
e. are all closely related structurally

A
2
P .74

Cor.I.28
Cor.X.21

3. If you were looking at an unknown organism under a microscope, you could determine whether it is an animal if

a. it showed movement
b. it had a cell wall
c. it has mitochondria
d. it had a nucleus
*e. it had no cell wall

A
4
P .36

Cor.I.00
Cor.X.04

4. A biological community is

a. made up of organisms all of which are closely related
b. made up of organisms which cooperate closely with each other to insure the maximum survival of all species within the group
*c. made up of organisms which are adapted to the physical conditions prevailing there
d. made up of organisms which live more or less independently of each other

A
5
P .58

Cor.I.00
Cor.X.19

5. A protozoan was being studied and it was found that the animal moved toward a source of light and away from an area where the experimenter added a particular chemical. The protozoan is exhibiting

a. learned behavior
*b. innate, inherited behavior
c. both innate and learned behavior
d. a very slight degree of intelligent behavior

CHAPTER XVIII

B
4
P .75

Cor.I.27
Cor.X.05

1. A protozoan was being studied and it was found that the animal moved toward a source of light and away from an area where the experimenter added a particular chemical. The organism is

a. positively phototropic and positively chemotropic
*b. positively phototropic and negatively chemotropic
c. positively phototropic and positively geotropic
d. negatively phototropic and positively geotropic

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A 1. The human tape worm
4
P .57 *a. can produce no digestive enzymes
b. spends its adult stage in pigs
Cor.I.50 c. may be contacted solely from pigs
Cor.X.18 d. is generally contacted from eating mutton

A 2. A genus of fluke which is a fish hatchery pest is
2
P .45 a. *Macrocystis*
*b. *Gyrodactylus*
Cor.I.44 c. *Lymnea*
Cor.X.15 d. *Didinium*

A 3. A human liver fluke is contacted by eating
4
P .16 a. raw vegetables
b. raw beef
Cor.I.26 *c. raw fish
Cor.X.19 d. raw pork

A 4. Each section of a tapeworms body is called
6
P .23 a. segment
*b. proglottid
Cor.I.33 c. abdominal pouch
Cor.X.23 d. independent egg plant

A 5. Which of the following is true?
2
P .42 a. flatworms have radial symmetry
*b. all flatworms are parasitic
Cor.I.47 c. flatworms have a complete digestive tract
Cor.X.30 d. flatworms are monoecious

A 6. The planarian belongs to the class
2
P .30 *a. Trematoda
b. Cestoidea
Cor.I.47 c. Polychaeta
Cor.X.16 d. Turbellaria

A 7. Which of the following is the name of the sheep fluke?
2
P .50 *a. *Fascicola Hepatica*
b. *Canis familiaris*
Cor.I.51 c. *Lymnea radiloris*
Cor.X.12 d. *Plasmodium vivax*

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A 8. The sheep liver fluke
4
P .59
a. lives exclusively in sheep liver in its lifecycle
* b. has a second host in its life cycle
Cor.I.56 c. produces few eggs because they develop only under optimal conditions
Cor.X.24
d. does not harm its host

A 9. Tapeworms hold on by means of
6
P .02 a. hooks
b. suckers
Cor.I.09 c. tooth-like structures
Cor.X.16 * d. hooks and suckers

B 10. The disease "liver rot" would most likely be found in
4
P .57 a. the desert
* b. a marshy area
Cor.I.66 c. the mountain tops
Cor.X.32 d. reptiles

A 11. The amoeba belongs to the class
2
P .34 a. Mastigophora
* b. Sarcodina
Cor.I.46 c. Sporozoa
Cor.X.18 d. Ciliata

A 12. The amoeba according to one theory
9
P .34 a. prefers to eat algae
b. changes from plasmasol to plasmagel as it moves a pseudopodium
Cor.I.37 * c. changes from plasmagel to plasmasol as it moves a pseudopodium
Cor.X.19 d. survives mainly by eating animals actually larger than itself

B 13. In a salt water environment in amoeba
6
P .28 * a. would probably not have a contractile vacuole
b. would get rid of excess water through the contractile vacuole
Cor.I.37 c. must get rid of excess salts through the contractile vacuole
Cor.X.19 d. use the contractile vacuole for locomotion

A 14. A genus of amoeba which may live commensally in the human mouth is
2
P .33 a. Entamoeba Histolytica
* b. Entamoeba Gingivalis
Cor.I.38 c. Escheroshia Coli
Cor.X.21 d. Entamoeba Linguosis

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

B
6
P .26
Cor.I.22
Cor.X.17

1. The gills and lungs of amphibians are

a. homologous structures
*b. analogous structures
c. both analogous and homologous structures
d. none of the above

A
6
P .66
Cor.I.25
Cor.X.27

2. The skin (epidermis) of amphibians is

a. dry and scaley
b. moist and scaley
c. dry and glandular
*d. moist and glandular

A
6
P .64
Cor.I.06
Cor.X.06

3. The adult **frog** acquires oxygen from air by all but one of the following ways

*a. gills
b. lining of mouth
c. skin
d. lungs

A
6
P .53
Cor.I.12
Cor.X.03

4. The lungs of reptiles are more efficient than the lungs of amphibians. This is so because

a. reptile lungs are much larger
*b. amphibians have other sources of oxygen
c. reptile lungs have more internal division
d. amphibian lungs have too many aveoli or air sacs

A
2
P .47
Cor.I.35
Cor.X.23

5. The eggs of amphibians, reptiles, and birds

a. have a hard outer shell
b. are deposited in water
*c. have yolk
d. are generally hatched in the oviduct

B
4
P .77
Cor.I.38
Cor.X.19

6. Most amphibians must return to the water to

*a. mate
b. find food
c. breath
d. die

A
2
P .70
Cor.I.23
Cor.X.29

7. External fertilization occurs in some

a. reptiles
*b. amphibians
c. birds
d. mammals

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A
2
P .63
Cor.I.13
Cor.X.11

8. The cloaca is generally not found in the

a. fish
b. reptiles
c. amphibians
*d. mammals

B
6
P .49
Cor.I.34
Cor.X.19

9. The four chambered heart of birds and mammals is quite efficient. This is so because

a. blood carrying oxygen is mixed with blood without oxygen
b. circulation of blood is more rapid in a four-chambered heart than in a three-chambered heart
c. blood carrying oxygen is separated from blood without oxygen
*d. all of the above are false

A
2
P .46
Cor.I.27
Cor.X.05

10. Compared to mammals, reptiles have

a. a more highly developed brain
b. better bite due to jaw muscles
*c. low food consumption
d. better heat conservation

B
7
P .61
Cor.I.41
Cor.X.22

11. Homeostasis in respect to body temperature is most constant in

a. frogs
*b. horses
c. turtles
d. salamanders
e. lizards

A
2
P .63
Cor.I.20
Cor.X.29

12. Which of the following belongs to the class Chondrichthyes?

a. perch
b. sturgeon
*c. California thornback
d. native cutthroat

B
2
P .58
Cor.I.46
Cor.X.41

13. If you caught a member of the class Osteichthyes, it would have

a. placoid scales
*b. a bony skeleton
c. a cartilage skeleton
d. up to seven gill openings

B
4
P .59
Cor.I.45
Cor.X.22

14. The lamprey is an example of an animal filling which of the following niches?

a. saprophytic
b. scavenger
*c. parasitic
d. symbiotic

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

B
2
P .27

Cor.I.36
Cor.X.21

15. A petroleum geologist must know which of the following groups of protozoans?

a. dinoflagellates
b. trypanosomes
* c. foraminifera
d. ciliates

A
4
P .50

Cor.I.41
Cor.X.22

16. Which of the following is true?

a. humans may die from muscle produced poisons in the summer
* b. a dinoflagellate species is responsible for toxins in mussles at a certain season of the year
c. mussel poisoning would not occur along our So. California coast
d. a mussel which would give a person mussel poisoning will have bright red valve nuscles

A
4
P .22

Cor.I.23
Cor.X.23

17. Foraminifera are not found alive below 12,000 ft. in the ocean because

a. they have no exoskeleton and are crushed by the pressure at greater depths
b. their test is made of silicon dioxide
c. their test is water soluable
* d. their text dissolves at greater depths

A
4
P .50

Cor.I.44
Cor.X.20

18. The disease called amoebic dysentery

a. affects the lungs
b. is always fatal
c. has no cure
*d. may be fatal if parasite invades the liver

A
2
P .46

Cor.I.40
Cor.X.12

19. Some Egyptian pyramids were made from lime deposits which formed from

a. radiolarian tests
b. snail shells
*c. foraminifera
d. ciliate silia

A
4
P .68

Cor.I.69
Cor.X.20

20. Most coelenterates are found

a. on land
b. in streams
*c. in ocean
d. in air

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A
2
P .37
Cor.I.42
Cor.X.19

21. The coelenterate that looks most plant-like is

a. physalia
* b. obelia
c. medusa
d. hydra

A
2
P .36
Cor.I.30
Cor.X.14

22. The most significant characteristic of coelenterates is

* a. radial symmetry
b. tentacles
c. two digestive layers
d. alternation of generation

A
2
P .46
Cor.I.38
Cor.X.11

23. The coelenterate with both hydroid and medusa stages is

a. hydra
* b. obelia
c. physalia
d. medusa

A
4
P .27
Cor.I.33
Cor.X.01

24. Sponges have cells specialized for

* a. water movement
b. respiration
c. digestion
d. reproduction

A
4
P .50
Cor.I.49
Cor.X.07

25. The round worm parasite infection that is incurrable in humans is

a. hook worm
* b. trichina
c. filaria
d. liver fluke

A
4
P .43
Cor.I.39
Cor.X.09

26. The parasitic round worm that is the scourage of mankind in most tropical and subtropical areas with populations of low economic level that go barefoot and use no sanitary toilets is

a. tape worm
b. trichina
c. filaria
* d. hook worm

A
2
P .28
Cor.I.36
Cor.X.24

27. The largest round worm parasite that man can have is

a. tapeworm
* b. guinea worm
c. filaria
d. ascaris

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A	15.	The lamprey has
2		
P .58	a.	the most specialized teeth in fishes
	* b.	a jawless mouth
Cor.I.44	c.	swift swimming ability
Cor.X.27	d.	a three-chambered heart
A	16.	Which of the following is a member of the class Osteichthyes?
2		
P .71	* a.	salmon
	b.	nurse shark
Cor.I.22	c.	eagle ray
Cor.X.12	d.	sting ray
A	17.	The skin of a fish
4		
P .52	a.	gives rise to fungicides
	b.	protects fish from dehydration
Cor.I-.02	c.	is made up of two layers as in other vertebrates
Cor.X.12	* d.	is protected by scales
A	18.	Which of the following fish does not have scales?
4		
P .57	a.	perch
	b.	bonito
Cor.I.33	* c.	catfish
Cor.X-.12	d.	eel
A	19.	According to evolutionary theory, teeth arose from modified
1		
P .55	a.	cycloid scales
	* b.	placoid scales
Cor.I.29	c.	ctenoid scales
Cor.X.14	d.	ganoid scales
A	20.	Which of the following is true?
1		
P .33	a.	cycloid scales have their origin in the dermis
	b.	ganoid scales are found on most fish today
Cor.I.31	*c.	placoid scales develop in the dermis
Cor.X.09	d.	herring have ctenoid scales
A	21.	Color changes in fishes depend upon special skin cells called
4		
P .72	a.	chromadiscs
	b.	erythropores
Cor.I.30	c.	astrophores
Cor.X.26	*d.	chromatophores

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A
4
P .58

Cor.I.35
Cor.X.20

22. If a fish is light in color the pigment granules are

a. missing
b. dispersed
*c. aggregated
d. masked

A
4
P .40

Cor.I.24
Cor.X.30

23. The time required for a color change in fishes

a. is about the same for any fish
b. may vary with the temperature and velocity of the water
*c. is very little when under control of the nervous system
d. is fastest when controlled by hormones

A
4
P .53

Cor.I.10
Cor.X.22

24. A flatfish can match an unusual environment because

a. the environmental color patterns reflects on the skin and it changes accordingly
*b. they interpret with their eyes the environmental pattern they display
c. they can feel the texture by an innate sense
d. they just move to an area which matches their mood

A
2
P .52

Cor.I.29
Cor.X.08

25. Which of the following is true?

a. fish cannot live out of water
b. the surf perch lay eggs into the open sea water
*c. fish with accessory breathing organs can utilize atmospheric oxygen
d. fish with very long fins are plankton eaters

A
4
P .58

Cor.I.37
Cor.X.28

26. One of the most important functions of the air bladder in fishes is its hydrostatic function which means

*a. fish/water density is nearly equal to one
b. a fish becomes more dense than water as it sinks
c. by losing air from the air bladder the fish becomes lighter
d. fish may propell themselves by using the air from the air bladder

A
8
P .62

Cor.I.45
Cor.X.28

27. A study of fishes is called

a. herpatology
b. aquanology
*c. icthyology
d. limnology

A
6
P .51

Cor.I.34
Cor.X.37

28. The term otolith means

*a. ear stone
b. ear bone
c. little stone
d. little bone

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A
4
P .53

28. The round worm parasite that during its early development migrates through the circulatory system to the lungs, is coughed up and swallowed

Cor.I.55
Cor.X.14

* a. ascaris
b. filaria
c. guinea
d. trichina

A
4
P .43

29. A serious disease that people of tropical areas such as the South Pacific Islands, that causes tissue growth and swelling due to fluid retention is caused by the roundworm

Cor.I.42
Cor.X.12

a. trichina
* b. filaria
c. loa lou
d. ascaris

A
2
P .37

30. Which of the following is not a characteristic of the phylum Nematoda?

Cor.I.38
Cor.X.22

a. sexes separate
* b. radial symmetry
c. complete digestive tract
d. no circulatory organs
e. three germlayers in Embryology

A
2
P .55

31. Which of the phylums do segmented worms belong to?

Cor.I.62
Cor.X.29

a. Platyhelminthes
b. Nemahelminthes
* c. Annelida
d. Nematoda

B
1
P .63

32. Which of the following is more advanced in the specializations of body functions?

Cor.I.64
Cor.X.32

a. Annelida
b. Nematoda
c. Platy Heliminthes
* d. Arthropoda

A
2
P .33

33. Which of the following is not a characteristic of the phylum Annelida?

Cor.I.43
Cor.X.23

*a. sexes separate
b. segmented body
c. circulatory organs
d. complete digestive tract

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A 34. The class of Arthropoda with the greatest number of species is
2
P .69 *a. crustacea
b. arachnoida
Cor.I.66 c. chilopoda
Cor.X.28 d. diplopoda
e. insecta

B 35. The compound eye is most efficient for
6
P .59 *a. seeing detail
b. flight direction
Cor.I.57 c. detection of color
Cor.X.26 d. selection of host for parasite
e. recognition of local mountains

A 36. The Arthropods have examples of all but one of the following
2
P .49 a. hermaphroditic
b. sexual dimorphism
Cor.I.36 *c. good memory
Cor.X.13 d. parasitism
e. exoskeleton

A 37. Sub-class malacostraca includes
2
P .26 *a. shrimp
b. king crabs
Cor.I.26 c. spiders
Cor.X.10 d. peripitus
e. scorpions

A 38. Class Arachnoidea contains
2
P .21 a. barnacles
b. grasshoppers
Cor.I.40 c. trilobites
Cor.X.23 *d. scorpions
e. butterflies

B 39. Ostracods are most important to
4
P .35 a. fishermen
*b. geologists
Cor.I.33 c. physiologists
Cor.X.09 d. botanists
e. zoologists

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A
2
P .60
Cor.I.08
Cor.X.17

29. The snake most closely related to the cobra is

a. rattlesnake
b. racer
c. garter snake
*d. coral snake

A
2
P .56
Cor.I.07
Cor.X.08

30. The largest turtle is the

a. mud turtle
b. desert tortoise
c. green turtle
*d. leatherback turtle
e. painted turtle

A
1
P .05
Cor.I-.03
Cor.X.11

31. The animal with the most highly developed skeleton is the

a. frog
b. salamander
*c. turtle
d. lizard

A
4
P .33
Cor.I.12
Cor.X.05

32. The animals with copulatory organs (for internal fertilization) are

a. salientia
*b. serpentes
c. caudata
d. rhyncocephalia

A
4
P .64
Cor.I.31
Cor.X.20

33. Amphibians, in general, find each other at mating time by responding to

*a. moisture
b. heat
c. light
d. food source

A
2
P .69
Cor.I.36
Cor.X.37

34. A characteristic all amphibians have in common is

a. two pairs of limbs
b. two eyes
*c. moist skin
d. internal fertilization

A
2
P .22
Cor.I.27
Cor.X.13

35. Class Salientia includes

a. snakes
b. birds
c. salamanders
*d. frogs
e. lizards

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A
2
P .40
Cor.I.19
Cor.X-.07

36. The most fish-like group listed below is

*a. caudata
b. salientia
c. serpentes
d. crocodillia

A
2
P .99
Cor.I-.01
Cor.X-.10

37. The single characteristic separating birds from all other vertebrates is the possession of

a. scales
b. teeth
*c. feathers
d. sternum

A
6
P .65
Cor.I.04
Cor.X.21

38. The structure(s) enabling birds to sustain flight without excessive tiring is (are)

a. large lungs
*b. air sacs
c. hollow bones
d. feathers

A
4
P .83
Cor.I.35
Cor.X.22

39. Which of the following senses is the most well developed in class Aves?

a. sight
b. taste
c. smell
*d. touch

A
1
P .77
Cor.I.18
Cor.X.14

40. Birds have undergone a series of skeletal modifications to assist in flight. Bone fusion is one modification. Which of the following best suits the function of bone fusion?

a. better muscle attachment
b. weight reduction
c. increased center of gravity
*d. rigidity for flight

A
1
P .82
Cor.I.26
Cor.X.21

41. Which of the following theories best answers the origin of the evolution of flight?

a. two-legged theory
b. four-wing theory
*c. gliding-form theory
c. hopping-and-jumping theory

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A
4
P .42

Cor.I.36
Cor.X.13

40. Copepods are beneficial because some are food for fish. Also they have members that are

a. parasitic on fish
b. sexually dimorphic
c. sessile
d. pelagic
* e. all of these

A
4
P .44

Cor.I.45
Cor.X.15

41. Barnacles are normally sessile but some are also

* a. parasitic
b. predatory
c. primary producers
d. photosynthetic

A
2
P .26

Cor.I.30
Cor.X.16

42. Class Ophiuroidea includes which organism?

* a. brittle star
b. sea cucumbers
c. sand dollars
d. sea urchins
e. sea lilies

A
2
P .29

Cor.I.24
Cor.X.04

43. One of the single most important characteristics for separating phylum Mollusca from phylum Echinodermata would be

a. bilateral symmetry
* b. a radula
c. ciliated cells
d. separate sexes

A
4
P .59

Cor.I.45
Cor.X.13

44. The sea urchin is economically important to California as in

a. a food source
* b. kelp destruction
c. beche-de-mer
d. rock erosion

A
2
P .27

Cor.I.37
Cor.X.09

45. One of the most important characteristics for separating Asteroidea from Gastropoda would be

a. bilateral symmetry
*b. radial symmetry
c. endoskeleton
d. exoskeleton

A
6
P .58

Cor.I.56
Cor.X.23

46. Locomotion is achieved in most mollusca by (a)

a. tube feet
*b. muscular foot
c. fleshy mantle
d. siphon

EXTENSION OF CHAPTER 18
(NOT IN TEXT)

A
6
P .45
Cor.I.40
Cor.X.19

47. The mantles primary function is

a. visceral protection
*b. shell secretion
c. locomotion
d. pearl formation

A
6
P .37
Cor.I.35
Cor.X.13

48. Food particles are moved to the mouth in Pelecypoda by

a. pescular action
*b. ciliary action
c. peristaltic action
d. wave action

A
4
P .14
Cor.I.05
Cor.X.00

49. The Pelecypoda leads a sedentary life and that of Cephalopoda a very active life. The latter organism is thus faced with a problem of supplying its gills with oxygenated water. It utilizes the following method

a. ciliary action
*b. pulsing mantle
c. two gill hearts
d. one siphon

A
1
P .52
Cor.I.53
Cor.X.28

50. When two structures develop in different ways but are anatomically alike and are possessed by two organisms of widely divergent origins such as the eye in squid and man, we give the following name to this phenomenon

a. divergent evolution
*b. convergent evolution
c. anthropomorphism
d. symmetry

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A
4
P .88
Cor.I.24
Cor.X.06

42. The force(s) necessary to sustain the flight of birds are (is)

a. thrust
b. lift
c. gravity
*d. thrust and lift
e. Wheaties

A
2
P .26
Cor.I.19
Cor.X.16

43. A common bird found on the Southern California coast is the

a. California quail
*b. killdeer
c. white-crowned sparrow
d. California thrasher

A
1
P .57
Cor.I.37
Cor.X.28

44. The ancient bird which demonstrates the evolution of birds from reptiles is

a. Ichthyornis
b. Pteradactyl
c. Teratornis
*d. Archaeopteryx

A
6
P .54
Cor.I.29
Cor.X.22

45. The primary function of the sternum is

*a. muscle attachment
b. rigidity
c. flight
d. streamlining

B
4
P .47
Cor.I.19
Cor.X.34

46. The dental formula for man is

*a. 2-1-2-3
b. 2-1-1-4
c. 1-2-3-2
d. 3-1-2-2

A
2
P .53
Cor.I.23
Cor.X.18

47. Which of the following belongs to the order Artiodactyla?

a. rhino
*b. hippo
c. zebra
d. horse

A
6
P .49
Cor.I-.23
Cor.X-.16

48. Which of the following have rootless teeth?

*a. beaver
b. man
c. cats
d. whales

EXPANSION OF CHAPTER 18
(NOT IN TEXT)

A
2
P .73

Cor.I.35
Cor.X.29

49. A mammal which lays eggs is the

a. armadillo
b. opossum
c. sloth
*d. playtypus

A
6
P .53

Cor.I.18
Cor.X.10

50. An animal which walks on its toes is the

a. horse
b. hippo
*c. cat
d. bear

CHAPTER XIX

A
4
P .90
Cor.I.36
Cor.X.22

1. Paramecia rid themselves of excess water through

a. cilia
b. oral groove
*c. contractile vacuole
d. food vacuole
e. cytoplasm

A
4
P .34
Cor.I.35
Cor.X.16

2. Animals differ from plants in that the former

*a. take in the complex organic molecules from the latter and thus derive all of the necessities of life
b. take in complex inorganic molecules and from these build all the necessary substances for life
c. take in complex organic molecules such as glucose and amino acids and break these down to form protein and carbohydrates that will be used in building new cells
d. can build from two inorganic substances, carbon dioxide and water, all the complex substances needed for life

A
6
P .97
Cor.I.28
Cor.X.18

3. Water is constantly flowing into the body of the paramecium. If it is to survive, paramecia must have some way of bailing itself out. This is done by means of the structures known as

a. food vacuoles
b. nucleus
c. cytoplasm
*d. contractile vacuole

A
6
P .84
Cor.I.42
Cor.X.25

4. If the contractile vacuoles of a paramecia were removed which of the following would happen?

a. it would not eat
b. it could not move
*c. it would burst
d. it would divide in half

A
3
P .32
Cor.I.36
Cor.X.14

5. During conjugation of the paramecium, the micronucleus first undergoes the process of

a. mitosis
*b. meiosis
c. disintegration
d. fusion

A
3
P .57
Cor.I.20
Cor.I.20

6. Conjugation in Paramecia is

a. asexual because cell division occurs by fission
b. sexual because the micronucleus divides by meiosis
c. asexual because both nuclei pinch in two
*d. sexual because fission is preceded by an exchange of nuclear material

CHAPTER XIX

B
7
P .55

Cor.I.28
Cor.X.09

1. Substances move from a point of higher concentration to a point of lesser concentration by diffusion. The paramecium maintains a cytoplasmic water content less than that of the surrounding watery environment. This principle is known as

   a. complementarity of function
   b. diversity of pattern
   c. biological evolution
   *d. homeostasis
   e. unity of pattern

B
3
P .33

Cor.I.22
Cor.X.30

2. Which one of the following endings makes an untrue statement? An animal that reproduces by fission

   *a. dies from old age as often as from any other cause
   b. produces offspring of the same size
   c. produces only two offspring at a time
   d. has part of the protoplasm passed on generation after generation

B
3
P .20

Cor.I.44
Cor.X.33

3. Which one of the following processes does not belong with the rest?

   *a. conjugation
   b. asexual-spore formation
   c. fission
   d. budding
   e. regeneration

B
3
P .64

Cor.I.20
Cor.X.22

4. How could asexual reproduction be an advantage to paramecia?

   a. cells will never grow old
   *b. if the environment was suitable for the parent, it will also be suitable for the offspring
   c. animals will have a chance to grow new contractile vacuoles
   d. a chance to produce new cytoplasm

B
7
P .45

Cor.I.40
Cor.X.29

5. Realizing the method of excretion in paramecium - what would be the affect on the activity of the contractile vacuole if the salinity of the paramecium's environment was increased?

   a. activity would stop
   *b. activity would decrease
   c. activity would increase
   d. no effect because the condition would remain the same

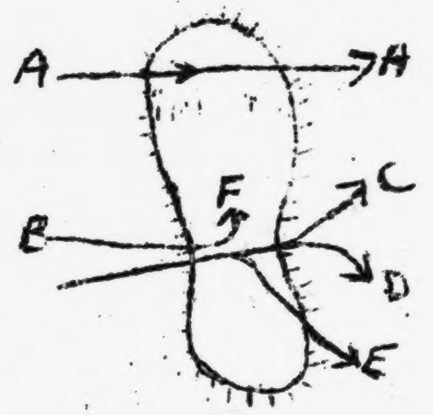
B
5
P .60

Cor.I.20
Cor.X.00

6. You are studying the behavior of a protozoan under the microscope. You introduce a drop of stain under the cover slip and observe that as the stain diffuses toward the protozoan, the animal appears to move in a direction away from the stain. Which of the following conclusion, if any, could be made from your observation?

a. the protozoan has a nervous system sensative to the stain
*b. the protozoan is expressing irritability toward the stain
c. the stain has nothing to do with causing the protozoan to change direction
d. no conclusion possible, due to insufficient evidence

Questions 7 and 8 refer to the drawing of the paramecium below. The capital letters represent various substances which may be involved in the life processes of the paramecium.



B
4
P .81

Cor.I.35
Cor.X.21

7. A would most likely be

a. oxygen
b. carbon dioxide
c. protein
*d. water

B
4
P .19

Cor.I.02
Cor.X-.25

8. It would be least resonable to assume that

*a. B is protein
b. B is glucose
c. B is oxygen
d. C is carbon dioxide

B
6
P .52

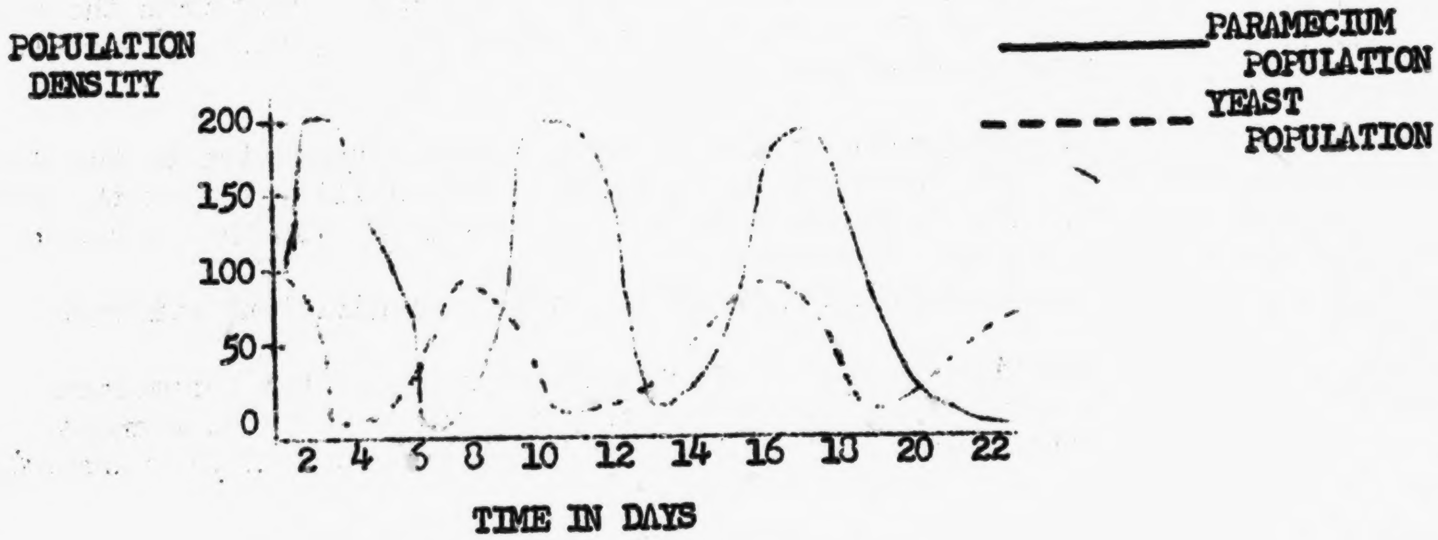
Cor.I.40
Cor.X.37

9. While carefully studying living paramecia with the aid of a microscope, a drop of saline solution (not strong enough to cause death) was allowed to run under the cover slip. On continued observation we would most likely note

a. the micronucleus disappear
b. all paramecia conjugating
c. the contractile vacuole emptying at a faster rate
*d. the contractile vacuole emptying less frequently

CHAPTER XIX

The graph below refers to questions 1 and 2



C
9
P .39

Cor.I.12
Cor.X.13

1. The graph indicates that paramicia
   - a. are 100 individuals on the 1st day
   - *b. are 200 individuals on the 2nd day
   - c. are 200 individuals on the 3rd day
   - d. will be 300 individuals on the 4th day
   - e. will be 500 individuals on the 5th day

C
4
P .85

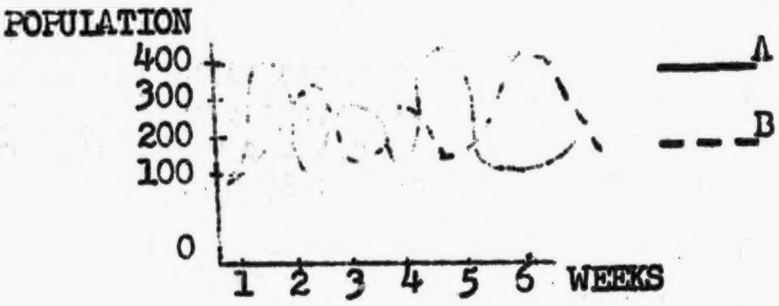
Cor.I.07
Cor.X-.06

2. The graph indicates that
   - a. paramecium and yeast populations increase simultaneously
   - b. paramecium and yeast populations decrease simultaneously
   - c. the yeast population will sometimes be greater than the paramecium population
   - *d. the two populations fluctuate in an interlocking rhythm

C
4
P .21

Cor.I.22
Cor.X.16

3. The graph below indicates that
   - a. A and B increase and decrease simultaneously
   - b. B will have a greater population than A
   - c. the prey of A is B
   - *d. the prey of B is A



CHAPTER XIX

D
9
P .32

Cor.I.33
Cor.X.18

1. A culture of Didinium reached a stable population of 400 individuals when a given number of paramecia was supplied. If no more paramecia were added the curve would show

a. an increase in the Dididium and a delayed increase in the paramecia
b. a decrease in the Dididium and a delayed decrease in the paramecia
c. an increase in the Paramecia and a delayed increase in the Dididium
*d. a decrease in the paramecia and a delayed decrease in the Dididium

D
1
P .67

Cor.I.54
Cor.X.40

2. What is the significance of sexual reproduction to the distribution of paramecia?

a. alternative methods of reproduction are available
b. they can reproduce more rapidly
*c. new gene combination may have greater adaptability
d. they are capable of reproducing under adverse conditions

D
1
P .51

Cor.I.22
Cor.X.33

3. During sexual reproduction, the genes for forming contractile vacuoles were mutated so that they would not appear in the paramecium. It is most likely that

a. the water concentration would be greater on the inside than the outside of the paramecium
b. the water concentration would decrease surrounding the paramecium
c. the paramecium could live without water in its habitat
*d. the paramecium's water concentration would rise to that of its surroundings

D
1
P .35

Cor.I-.02
Cor.X.01

4. Single celled organisms (like the paramecium) as well as multicellular organisms (like man) have the ability to carry on many similar vital functions such as taking in O_2 and giving off CO_2. Which of the following is generally accepted as an explanation for this amazing similarity?

a. convergent evolution of cells or cell structures to carry on necessary processes
b. diversity of type and unity of function
c. survival of only the forms of life that could successfully adapt by natural selection
d. 2 of the 3 above are correct
*e. all of the above are correct

CHAPTER XX

A 1. Sea anemones are members of the phylum
8
P .57 a. Nematoda
b. Annelida
Cor.I.33 c. Platyhelminthes
Cor.X.22 *d. none of these

A 2. If your teacher asked you to go out and seek planaria, you
4 would go to the
P .44
a. ocean
Cor.I.09 b. sea shore
Cor.X.04 c. meadow
*d. fresh-water ponds

A 3. The groups of plants or animals in which interbreeding may
8 freely take place in nature is the definition of
P .60
a. genera
Cor.I.28 *b. species
Cor.X.14 c. classes
d. phyla

A 4. A family includes closely related
8
P .53 a. orders
b. classes
Cor.I.38 *c. genera
Cor.X.16 d. phyla

A 5. To determine relationships between groups of plants or animals,
3 scientists consider
P .78
a. similar embryonic development
Cor.I.24 b. biochemical and protein similarities
Cor.X.15 c. structural homologies
*d. all of these

A 6. The phylum for which the general characteristics include an
8 exoskeleton and jointed feet is the
P .79
a. insecta
Cor.I.37 *b. arthropoda
Cor.X.36 c. crustacea
d. arachnida

A 7. In evolution, the higher animals are characterized by
6
P .69 a. spherical symmetry
b. radial symmetry
Cor.I.35 *c. bilateral symmetry
Cor.X.29 d. no symmetry

A
6
P .51

8. What animal body is constructed much like a tall vase with a single narrow opening at the top leading into the digestive cavity with a circle of tentacles surrounding the mouth

Cor.I.48
Cor.X.20

a. planaria
b. paramecium
*c. hydra
e. earthworm

A
6
P .45

9. Which of the following animals shows least division of labor?

a. hydra
b. planaria
Cor.I.27
Cor.X.41
*c. paramecium
d. earthworm
e. man

A
8
P .37

10. If you examined an unknown multicellular organism with the following characteristics - complete digestive system, no blood present, separate sexes - you would classify it as belonging to the phylum

Cor.I.16
Cor.X.00

a. Platyhelminthes
b. Annelida
c. Coelenterata
d. Porifera
*e. none of the above

A
8
P .63

11. From a marine habitat you find a specimen with the following characteristics - radial symmetry, spiny exoskeleton, and tube feet for locomotion - . On the basis of this information, this specimen most likely belongs to the phylum

Cor.I.55
Cor.X.28

a. Arthropoda
*b. Echinodermata
c. Coelenterata
d. Protozoa

A
6
P .57

12. From your knowledge of evolution, homology, and analogy, choose the best statement concerning the relationship between the several fields of knowledge

Cor.I.10
Cor.X.12

a. in homology one structure is modified into several, while in analogy several different structures are changed until they resemble one another
*b. homology refers to structures of common origin and analogy refers to a common function
c. evolution may be expressed in terms of homology and not analogy
d. evolution is the change which enables homologous structures to be modified into several and analogous structures to be changed to resemble one another

A
8
P .41

13. Which does not belong to phylum Protozoa?

a. paramecium
b. amoeba
Cor.I.34 *c. hydra
Cor.X.23 d. didinium
e. stentor

A
8
P .59

14. The plant kingdom and the animal kingdom are divided into phyla according to

*a. homology
Cor.I.33 b. analogy
Cor.X.18 c. color
d. size
e. habitat

A
8
P .45

15. Two living things are put into the same division in the scheme of classification if they both

a. occupy the same habitat
Cor.I.33 b. have the same general appearance
Cor.X.13 c. have similar functions performed by their various structures
d. have similar life habits
*e. have homologous structures

A
8
P .49

16. *Felis tigris* is an example of binomial nomenclature. These two words stand for

a. species and genus
Cor.I.37 b. order and family
Cor.X.17 c. phyla and species
d. order and genus
*e. genus and species

A
1
P .79

17. Important characteristics of Annelids which demonstrate evolutionary advances over coelenterates are

a. flattened bodies and two main layers of cells in the body
Cor.I.23 *b. a segmentad body, with a circulatory system
Cor.X.18 c. two main layers of cells in the body and the body covered by a shell
d. radial symmetry and "stinging cells"

CHAPTER XX

B
6
P .21
Cor.I.19
Cor.S.21

1. In a protozoan all life activities take place and are controlled by one cell. In multicellular animals, different cells are specialized for different functions. Therefore we can conclude that

   a. multicellular animals are more efficient in meeting the demands of life
   b. the size of an animal is related to its complexity
   c. basic life processes occur in unicellular as well as multicellular animals
   *d. division of labor does not exist in unicellular life forms

B
6
P .65
Cor.I.38
Cor.X.30

2. The outer covering of plants and animals are

   a. homologous because they both provide protection
   b. homologous because they both originate from the ectoderm
   *c. analogous because they both provide protection
   d. analogous because they both originate from the ectoderm

B
2
P .67
Cor.I.40
Cor.X.34

3. Radial symmetry is to starfish as bilateral symmetry is to

   a. hydra
   b. jellyfish
   *c. fish
   d. sea urchins

B
8
P .71
Cor.I.43
Cor.X.29

4. A student brings a living organism to his teacher. It is multicellular, has an exoskeleton, jointed appendages, and compound eyes. It could be classified as a (an)

   a. Coelenterate
   *b. Arthropod
   c. Annelid
   d. Mollusk

B
8
P .63
Cor.I.17
Cor.X.21

5. In which of the following categories would you be able to place the largest number of the specimens which follow: lion, seal, whale, man, bird, hydra, paramecium, snail, earthworm

   *a. kingdom
   b. species
   c. family
   d. phylum
   e. order

B
6
P .24
Cor.I.34
Cor.X.30

6. Examples of homologous structures would be

   a. tentacles of jelly-fish - - rays of starfish
   *b. wings of birds - forelegs of a cow
   c. lungs of man - gills of fish
   d. cilia of paramecia - hair of mammals

B
8
P .40

7. Concerning the classification of plants and animals, which of the following is true?

Cor.I.33
Cor.X.18

*a. there are fewer orders than genera
b. there are more classes than orders
c. there are fewer families than classes
d. there are more phyla than orders

B
8
P .73

8. If you found the fossil remains of an unknown animal with a large head, four legs and a tail, you could say that when it was alive it was

Cor.I.22
Cor.X.21

*a. bilaterally symmetrical
b. sessile
c. radially symmetrical
d. an invertebrate

B
9
P .63

9. While making a routine blood check the doctor found a small, flattened, bilaterally symmetrical organism. To which phylum does this description fit?

Cor.I.52
Cor.X.27

a. Coelenterata
b. Porifera
c. Nematoda
*d. Platyhelminthes

C
8
P .47

Cor.I.15
Cor.X.20

1. You are on a safari in Africa and have found several specimens of animal life which are new to you. You notice the following characteristics: radial symmetry, exoskeleton, jointed appendages, sexual reproduction, primary consumer. Into what phylum would you put these animals?

a. Arthropoda
b. Mollusca
c. Annelida
d. Nematoda
*e. doesn't fit any of the above

C
3
P .40

Cor.I.36
Cor.X.31

2. The common garden snail *Helix aspersa* is known to be a hermaphroditic organism. However, it is also known that *H. aspersa* shoot "live darts" at each other to stimulate sexual interest, and copulation has been observed. With this information, which of the following statements would you believe to be correct?

*a. *H. aspersa* don't fertilize their own eggs
b. eggs and sperm are produced by all organisms
c. one copulation is good for 3 years
d. there is no exchange of genetic material
e. snails are Annelida

C
8
P .17

Cor.I-.12
Cor.X-.15

3. A scientist found the fossil remains of an animal. He said the animal was a chordate because the fossil showed an

a. exoskeleton
b. endoskeleton
*c. vertebral - column
d. appendages
e. only b, c, and d

CHAPTER XXI

A
6
P .53
Cor.I.30
Cor.X.31

1. Digestion in man is

a. extracellular
b. intracellular
c. dependent upon enzymes
d. controlled by hormones
*e. a, c, and d are correct

A
8
P .23
Cor.I.15
Cor.X.15

2. Utilization of products of digestion in synthesis best defines

a. absorption
*b. assimilation
c. respiration
d. excretion
e. secretion

A
6
P .57
Cor.I.24
Cor.X.23

3. When comparing digestion of food in the *paramecium* and *hydra* we find that

a. digestion is accomplished by enzymes, only in the hydra
b. the digestive process is only extracellular in both paramecium and hydra
c. the digestive process is only intracellular in both paramecium and hydra
*d. the digestive process is intracellular in paramecium and both extracellular and intracellular in hydra
e. food passes in one direction only in the hydra

A
6
P .60
Cor.I.41
Cor.X.27

4. The small hollow structure found at the junction of the small and large intestine is the

a. colon
b. rectum
*c. appendix
d. gall bladder
e. pancreas

A
6
P .29
Cor.I.25
Cor.X.08

5. Pepsin is to protein as lipase is to

*a. fats
b. proteins
c. carbohydrates
d. amino acids
e. salts

A
6
P .58
Cor.I.41
Cor.X.16

6. Any undigested material in the hydra is ejected from the digestive cavity through the

a. contractile vacuole
b. food vacuole
c. anus
d. mouth

A
6
P .46

Cor.I.16
Cor.X.26

7. The principle function of digestion of food is

a. absorption of organic matter into living cells
*b. chemically changing large organic molecules into smaller ones
c. chemically combining small molecules into larger organic molecules
d. physically changing the shape of food molecules, to allow for movement through cell membranes

A
6
P .75

Cor.I.20
Cor.X.10

8. The significance of the relationship between the digestion of food and enzymes is

a. enzymes are one product of digestion
b. enzymes bring about digestion only inside of living cells
*c. enzymes bring about the digestion of food
d. only the higher animals need enzymes to bring about digestion

A
4
P .46

Cor.I.09
Cor.X.16

9. Some of the modern day antibiotics have the ability to destroy many different kinds of bacteria within our bodies. If all the bacteria in our body were destroyed, what might the result be?

*a. vitamin deficiency
b. ulcers
c. appendictis
d. indigestion
e. passage of excessive amounts of water

A
6
P .45

Cor.I.39
Cor.X.31

10. The digestive system in man consists of a long tube that extends from the mouth to the anus. The complete process of digestion ends in the small intestine. What three secretions mix with the food in the small intestine?

a. saliva, gastric juice, bile
b. gastric juice, bile pancreatic juice
*c. bile, pancreatic juice, intestional juice
d. pancreatic juice, intestional juice, gastric juice

A
6
P .45

Cor.I.34
Cor.X.15

11. If you were to chew a soda cracker for ten minutes which of these would not happen?

*a. it would remain starch and be digested upon reaching the stomach
b. it would be digested to double sugar by an enzyme present in the saliva
c. it would be mixed with saliva and mucous
d. it would be ground and mixed with water to be completely degested further along the alimentary tract

A
2
P .54
Cor.I.27
Cor.X.24

12. Which of the following statements refers to both hydra and planaria?

a. body of 2 cell layers
*b. digestive cavity with a single opening
c. no definite head
d. hermaphroditic...both male and female organs in one individual
e. exhibit bilaterial symmetry

A
6
P .47
Cor.I.28
Cor.X.25

13. Most multicellular animals depend upon extracellular digestion to supply proper food needs. This extracellular digestion is possible because of

a. pinocytosis
*b. division of labor between cells
c. organism's ability to move
d. no special dependence on enzymes
e. the circulatory system

A
7
P .85
Cor.I.08
Cor.X.02

14. Animals must have available to their interior cells

a. glucose
b. glycerol and fatty acids
c. amino acids
d. vitamins, water and minerals
*e. all of these

A
6
P .63
Cor.I.23
Cor.X.22

15. How is the structure of the small intestine adapted for more efficient absorption of digested food?

a. folds in the intestine
b. villi
c. length of the intestine
*d. all of these

CHAPTER XXI

B
6
P .73

Cor.I.33
Cor.X.23

1. The text states that hydra apparently cannot digest carbohydrates. Which of the following seems the most logical explanation for this?

   *a. the proper enzymes to chemically digest carbohydrates are not present
   b. hydra cells do not use glucose in respiration
   c. hydra is not able to take into the digestive cavity foods containing carbohydrates
   d. carbohydrates cannot be hydrolized by animals that live in water

B
6
P .23

Cor.I.12
Cor.X.22

2. Most meat-eating animals are able to digest large pieces of food while most plant eaters thoroughly chew their food. How does this relate to the overall process of digestion.

   a. the common plant foods, sugars and starches, are digested in the mouth
   *b. digestion of meat protein does not begin until it reaches the stomach
   c. amylase, the starch digesting enzyme, in saliva and gastric juice, combines to make the food into a soup-like mixture
   d. all of these
   e. none of these

B
6
P .72

Cor.I.14
Cor.X.02

3. The text states that hydra cannot digest carbohydrates. The reason is probably the lack of

   a. hormones
   *b. enzymes
   c. a stomach
   d. a mesoderm

B
6
P .58

Cor.I.36
Cor.X.29

4. In hydra, what is the best explanation for successful movement of food and waste materials into and out of cells?

   a. small size
   b. some cells lining the digestive cavity have flagella
   c. a true metazoan structure
   *d. nearly all cells are in contact with the watery environment

B
6
P .25

Cor.I.32
Cor.X.24

5. Birds lack a large intestine. What affect does this have upon the digestive process?

   a. less food is absorbed
   *b. less water is absorbed
   c. the process of digestion takes much longer
   d. none

B
6
P .56

Cor.I.25
Cor.X.08

6. Characteristics that are shared by the various molecules that are the end products of digestion of food are

*a. water soluble and small enough to pass through cell membranes
b. all carbohydrates
c. all contain atoms of C, H, O, and N
d. all a result of dehydration syntheses

B
4
P .48

Cor.I.17
Cor.X.05

7. The evolutionary significance of the adaptation of heterotrophs for extracellular digestion is that

a. it would be necessary for the heterotroph to develop a mechanism for photosynthesis
*b. it would permit the organism to feed on other organisms, thus extending its food supply
c. it would greatly decrease its prospects for survival
d. autotrophs cannot also be heterotrophs

B
6
P .45

Cor.I.39
Cor.X.19

8. A detailed study of the digestive tract of an animal revealed the following information: the digestive tract had only one opening, the cells lining the digestive cavity secreted digestive enzymes, the cells lining the digestive cavity engulfed small particles of food, a muscular projectible pharynx was present. This animal was probably a

a. hydra
*b. planaria
c. earthworm
d. insect

B
6
P .49

Cor.I.28
Cor.X.21

9. With an assembly-line digestive system such as that found in the earthworm, one would expect that

a. more enzymes are required to break down food particles
b. less efficiency results, overall
c. peristalsis is not necessary
d. specialization of cells is not needed
*e. differentiation of cells is represented

B
6
P .44

Cor.I.25
Cor.X.19

10. Primarily all the liquids are removed from the "gruel" (masticated and nearly digsted food solids) in the large intestine. Removal of fluids earlier in the digestive system would result in

a. increased peristalsis activity
b. greater sloughing off of cells of the digestive tract and greater loss of symbiotic bacteria
c. decreased absorption of vitamins
d. constipation
*e. all except a

B
9
P .34

Cor.I.27
Cor.X.13

11. John has eaten a new food product. The principle food stuff present in this material is not known. A blood sample was taken from his arm 15 minutes later and the hormone gastrin was found to be in greater concentration then normal, the food which was eaten was probably primarily

a. starch
b. sugar
c. fat
*d. protein

B
7
P .81

Cor.I.17
Cor.X.21

12. Which of the following foods is not essential to life?

a. sugars
b. fats
c. vitamins
d. proteins
*e. meat

B
6
P .43

Cor.I.36
Cor.X.33

13. Gall stones which block the bile duct would probably

a. slow down the production of bile
*b. inhibit fat digestion
c. retard protein digestion
d. inhibit starch digestion

C
6
P .48

Cor.I.19
Cor.X.09

2. In the digestive process in cattle, plant material containing cellulose is digested. In man, little, if any cellulose is digested. Most is eliminated as waste material. Based on this information, which of the following might be concluded?

a. the digestive system is more complex in cattle than in man
*b. cattle contain digestive enzymes not found in man
c. cellulose is not necessary for proper body functioning in man
d. none of these

D
9
P .50

Cor.I.33
Cor.X.05

1. The vermiform appendix is small and vestigial in man, but is very large in rats and beavers. Based on the diet of these animals, what might you assume is the function of the appendix?

a. breakdown of fats
*b. breakdown of plant materials such as cellulose, etc.
c. destruction of bacteria and other pathogens
d. breakdown of proteins

D
9
P .65

Cor.I.21
Cor.X.07

2. An unknown substance isolated from an unknown part of a dogs digestive tract was placed into six different test tubes. The tubes were arranged in pairs. To one pair of tubes, a small amount of cooked potato was added. To the second pair, small chunks of lean meat were added. To the last pair of tubes, small chunks of butter were added. Into one tube of each set several drops of HCl (dilute) were added. All the tubes were kept at body temperature for 12 hours. At the end of this time the tubes were examined and the following observations recorded.

The only appreciable change in any of the food samples occured in the tube containing the unknown substance, and meat. We may assume that the unknown substance probably came from the dogs

a. mouth
b. large intestine
*c. stomach
d. small intestine

D
7
P .39

Cor.I.26
Cor.X.19

3. Which one of the following made the hypothesis on the nervous control of pancreatic juice secretion unreasonable?

a. all secretions are under control of hormones, not nerves
b. when nerves of pancreas were cut, there was usually no production of pancreatic juice
c. with nerves to the pancreas cut, the lining of the small intestine could secrete pancreatic juice
*d. with nerves cut to pancreas, the small intestinal wall had the ability to stimulate the pancreas to produce pancreatic juice

D
9
P .50

Cor.I.42
Cor.X.09

4. An unknown substance was found in the blood stream of a dog. After 12 hours in a test tube with meat, potatoes, and butter, the butter was changed to glycerol and fatty acids. The unknown substance probably came from the dog's

a. mouth
b. stomach
c. large intestine
*d. small intestine

CHAPTER XXII

A
8
P .56

Cor.I.29
Cor.X.04

1. The name of the chamber that pumps the blood to all parts of the body is

a. left atrium
*b. left ventricle
c. right ventricle
d. right atrium

A
8
P .47

Cor.I.45
Cor.X.27

2. Which of the following cells plays a key role in blood clotting?

a. white blood cells
b. red blood cells
*c. platelets
d. capillary cells

A
6
P .65

Cor.I.28
Cor.X.19

3. Which of the following is correct? Blood flows from

a. right atrium to left atrium
b. right atrium to left ventricle
*c. right ventricle to the lungs
d. left atrium to the lungs

A
6
P .63

Cor.I.38
Cor.X.32

4. The only vessels in the circulatory system which will allow molecules to diffuse across them readily are

*a. capillaries
b. veins
c. arteries
d. lymph vessels
e. lymph nodes

A
2
P .50

Cor.I.31
Cor.X.24

5. The least complex group of animals to have a circulatory system is

a. fish
b. snake
*c. segmented worm
d. planaria
e. insects

A
6
P .72

Cor.I.24
Cor.X.32

6. In humans the wall of the left ventricle is thicker than the wall of muscle in the right ventricle. This is of significance to the functioning of the heart due to the fact that

a. the right ventricle is much larger than the left ventricle
b. the right ventricle receives only blood low in oxygen content
c. the right ventricle pumps blood to all the extremities of the body
*d. the left ventricle pumps blood to all the extremities of the body

A
9
P .68

Cor.I.21
Cor.X.22

7. It is said that William Harvey almost proved the circulation of blood because he

- a. saw arteries only
- b. saw veins only
- c. saw arteries, capillaries, veins but believed the liver made the blood
- *d. could not see the blood transferred from arteries to the veins

A
6
P .85

Cor.I.28
Cor.X.12

8. The purpose of the valves on the pulmonary arteries and the aorta is [redacted]

- a. to cause "lub-dub"
- *b. to stop back flow of the blood
- c. to make the flow of the blood steadier
- d. slow flow of blood

A
6
P .53

Cor.I.34
Cor.X.18

9. The function of the lymph is

- a. to carry away waste products
- b. to carry oxygen to the cells because of the presence of hemoglobin
- *c. to bathe cells and carry some harmful organisms to collection and destruction centers
- d. to destroy actively harmful organisms by engulfing them

A
6
P .87

Cor.I.32
Cor.X.07

10. The open circulatory system pertains to

- a. paramecium
- b. hydra
- c. man
- d. earthworm
- *e. grasshopper

A
8
P .22

Cor.I.04
Cor.-.01

11. The brachial artery in man is

- a. tissue
- b. a cell
- c. an organ system
- *d. an organ

A
8
P .82

Cor.I.24
Cor.X.28

12. An example of an animal with an open circulatory system would be

- a. man
- b. earthworm
- *c. insect
- d. frog

A
8
P .59

Cor.I.31
Cor.X.18

13. An invertebrate which has hemoglobin is the

a. grasshopper
b. spider
*c. earthworm
d. guppy

A
6
P .67

Cor.I.33
Cor.X.28

14. Which ending makes an untrue statement? White corpuscles

a. engulf and destroy germs that get into the blood
*b. carry oxygen to all the cells and carbon dioxide from them
c. are like amoebas so far as movement is concerned
d. are formed in marrow and in lymph nodes
e. are the least numerous of the blood cells

A
8
P .50

Cor.I.32
Cor.X.12

15. Harvey could not conclusively prove that blood circulates because

a. he only speculated about the idea
b. believed in it
c. didn't experiment enough
d. only worked with dead animals
*e. could not see capillaries

A
8
P .41

Cor.I.35
Cor.X.30

16. Hydrolyzed food products are carried throughout the body in

a. white blood cells
*b. plasma
c. red blood cells
d. hemoglobin
e. platelets

CHAPTER XXII

B
6
P .49

Cor.I.14
Cor.X.14

1. The grasshopper has an open circulatory system which does not permit a rapid circulation of body fluids. However, the grasshopper is able to expend a large amount of energy very rapidly. This is possible because

a. it stores oxygen
b. oxygen diffuses from the blood cavities to the muscles
*c. its tracheal tubes reach all parts of the body
d. oxygen is absorbed through the skin

B
8
P .07

Cor.I.06
Cor.X.03

2. The arteries probably appear redder than the veins because there is

*a. a reflection of light from the walls of the veins
b. blue blood in the veins are red blood in the arteries
c. a lack of muscle action in walls of veins compared to that of the arteries
d. free air in the arteries

B
6
P .62

Cor.I.36
Cor.X.29

3. An animal has a closed circulatory system, gills, two excretory organs and an uncovered skin. You might correctly assume that it is

a. an aquatic insect
b. a seal
*c. a larval amphibian
d. a marine annelid worm

B
6
P .50

Cor.I.03
Cor.X.09

4. The ratio of arteries to capillaries by volume is

a. approximately the same
b. greater in the arteries because they are very large
*c. greater in the capillaries because they are numerous
d. not known because there is no way of determining the difference
e. not constant because of dilation of the arteries

B
8
P .32

Cor.I.24
Cor.X.23

5. From your previous knowledge of scientific words and terms, which of the following would most likely be polymorphonuclear?

a. red blood cells
b. vein
c. artery
*d. white blood cell
e. the heart

B
6
P .55

Cor.I.34
Cor.X.19

6. The advantage of a four chambered heart over a three chambered heart would be

a. the heart does less work
*b. more fresh blood is pumped through the arteries
c. a better supply of oxygen in the veins
d. more fresh blood is pumped through the veins
e. the fact that there are capillary beds present

B
6
P .66
Cor.I.22
Cor.X.10

7. The circulatory system that moves the greatest volume of substances for volume of blood (the most efficient) is found in

*a. the birds
b. reptiles
c. crayfish
d. fish
e. hydra

B
8
P .15
Cor.I.07
Cor.X-.04

8. A person weighing 150 pounds has approximately

a. 2 gallons of blood
b. one gallon of blood
c. 2 liters of blood
*d. 3 liters of blood
e. five gallons of blood

B
6
P .79
Cor.I.31
Cor.X.18

9. The advantage of aortic arches in the earthworm is

a. that more red blood cells are produced
b. that more white blood cells are produced
c. that increased body size is a direct result
*d. that circulatory pressure is increased

B
8
P .78
Cor.I.33
Cor.X.17

10. Lymph nodes and white blood cells are similar in that they both

a. have multi-cellular nuclei
b. are blood cells
c. contain hemoglobin
*d. remove harmful bacteria
e. contain a clotting substance

B
6
P .73
Cor.I.31
Cor.X.19

11. Artery walls are more elastic and muscular than the walls of veins to

*a. withstand the blood pressure created by the heart's pumping
b. equalize the pressure throughout the arterial system
c. insure no loss of blood plasma by diffusion
d. keep the leucocytes from escaping

B
8
P .25
Cor.I-.06
Cor.X.09

12. Which ending makes the following statement false? In man, the blood circulates

a. through all the blood vessels at the same speed
b. to any part of the body and back again in a few seconds
c. through the lungs, where hemoglobin in the red corpuscles combines with oxygen
*d. at the same speed through all parts of the body
e. through the liver where it gets rid of impurities

B
8
P .46

Cor.I.42
Cor.X.26

13. If you witnessed an accident where the pulmonary artery was severed, you would expect that

a. the blood would have high oxygen content
*b. the blood would have low oxygen content
c. blood would flow out slowly
d. valves should be visible
e. blood would be coming from the left atrium

CHAPTER XXII

C
7
P .34

Cor.I.32
Cor.X.24

1. A blood test reveals a high white count and a normal red count. The possible explanation of this may be

a. anemia only
b. high blood pressure
*c. leukemia
d. low hemoglobin
e. poor RBC production

C
6
P .33

Cor.I.03
Cor.X.03

2. You are visiting the hospital where a friend of yours just had a baby. You notice that one of the babies has a "bluish" color to its skin and doesn't seem to be as active as the other babies. You suspect that

a. the baby is premature
b. the baby should be in an incubator
*c. the wall between the atria is not closed
d. the wall between left atrium and left ventricle is not closed
e. the baby is cold

C
7
P .07

Cor.I.03
Cor.X0.13

3. A sample of blood was carefully studied. It was found that a cubic mm. of the blood contained 18,000 white blood cells. One might presume that the individual

a. was suffering from a rare blood disease
*b. had appendicitis
c. sore throat
d. had nothing wrong with him

C
7
P .45

Cor.I.40
Cor.X.36

4. A blood test showed that the blood would not clot. One might assume that the individual lacked

a. white blood cells
b. red blood cells
c. hemoglobin
*d. platelets
e. blood plasma

CHAPTER XXII

D
6
P .80

Cor.I.32
Cor.X.10

1. The circulatory systems function in the animal is to

   a. provide nutrients for cell growth, maintainence, repair and reproduction
   b. carry away waste products
   c. deliver sugars and fats to storage areas for later use
   d. combat infection
   *e. all of these

D
6
P .59

Cor.I.26
Cor.X.19

2. In the process of transportation of nutrients to the cells of the body the human circulatory system can be compared to what other living system?

   *a. the conducting system in plant stems through tracheids and vessels
   b. the absorption and utilization of organic nutrition from the environment by the heterotrophic system in bacteria
   c. the vacuole system of food transport in paramecium
   d. the diffusion transport system of flagellated cells lining the digestive cavity of a hydra

D
6
P .46

Cor.I.43
Cor.X.25

3. Some animals, such as a hydra, require no special transportation system while other animals, such as a grasshopper, cannot survive without such a system. This is due to the fact that

   *a. diffusion can supply the cells with their needed materials
   b. the cells of the hydra do not need the same materials as the cells of a grasshopper
   c. the hydra has a more advanced type of transportation system, thereby eliminating the need of specialized conducting structures
   d. the hydra uses the dissolved oxygen in the water for its transportation system

CHAPTER XXIII

A
8
P .74
Cor.I.21
Cor.X.06

1. Respiration in grasshoppers is accomplished by

a. lungs
*b. tracheal tubes
c. gills
d. moist skin
e. none of the above

A
2
P .84
Cor.I.41
Cor.X.23

2. In which of the following organisms is the respiratory process most highly developed?

a. hydra
*b. earthworm
c. planaria
d. paramecium

A
6
P .66
Cor.I-.04
Cor.X.05

3. Respiration refers to

a. the oxidation process
b. the breathing process
*c. both the oxidation process and the breathing process
d. pulmonary respiration only
e. none of the above

A
8
P .46
Cor.I.45
Cor.X.30

4. How are the respiratory organs related to an organism's environment?

a. man has a mouth
b. planaria have tracheal tubes
c. hydras have gills
*d. grasshopper has tracheal tubes
e. fish have tracheal tubes

A
8
P .46
Cor.I.06
Cor.X.20

5. At 13 kilometers above sea level the percentage of hemoglobin in lungs that combines with oxygen is never more than

a. 10 per cent
*b. 50-60 per cent
c. 80 per cent
d. 25 per cent

A
8
P .82
Cor.I.39
Cor.X.17

6. Carbon dioxide leaves hydras and planaria by

*a. simple diffusion
b. transportation
c. specialized organs
d. cells

A
6
P .80
Cor.I.37
Cor.X.10

7. An animal that is capable of respiration through the skin is

a. snake
b. dog
*c. frog
d. ant

CHAPTER XXIII

B
6
P .86

1. Generally there are two methods by which a grasshopper can be killed. One way is by a stomach poison taken through the mouth. The second method is by the use of dust. How does dust work in killing the grasshopper?

Cor.I.17
Cor.X.06

*a. the dust clogs the respiratory spiracles and the grasshopper suffocates
b. the dust will react chemically with the chitin on the surface of the body
c. the dust will cause paralysis of the muscles and the animal will die for lack of food
d. the dust destroys the Malpighian tubes

B
6
P .51

2. Outer covering on primitive animal has a definite correlation to the type of respiration. Choose the statement to corroborate this statement

Cor.I.18
Cor.X.10

a. animals with dry skins must obtain oxygen without any moist membranes
b. size of the animal has nothing to do with oxygen supply through skin
*c. thin, moist membranes are essential - either within the body or as an outer covering
d. thin, moist membranes have a good blood supply
e. respiration is dependent upon moisture at any level

B
6
P .82

3. Breathing is related to respiration as

Cor.I.19
Cor.X.20

*a. eating is related to digestion
b. enzymes are related to hydrosysis
c. digestion is related to respiration
d. digestion is related to excretion

B
6
P .26

4. Ninety-five percent of the hemoglobin performs its function at sea level, whereas only fifty percent functions as 8 miles above sea level. The role of hemoglobin is

Cor.I.29
Cor.X.31

a. to aid in the diffusion of gases
*b. form a compound with the gases
c. keep the membranes moist
d. supply the blood with iron

B
6
P .24

5. The respiratory system of all higher invertebrates and vertebrates

Cor.I.39
Cor.X.19

a. are much alike in form
b. include skin as one of the respiratory structures
c. in a few cases have no osmosis of any substance into, or out of them
d. rarely or never include breathing organs
e. have vast surface areas

B
6
P .23

Cor.I.10
Cor.X.01

6. Respiratory structures in man which are similar to tracheoles of insects are

a. capillaries
b. trachea
*c. bronchioles
d. lungs

B
7
P .21

Cor.I.11
Cor.X.02

7. Which answer best exemplifies homeostasis? High elevation contains less O_2, therefore

a. an increased breathing rate and hyperventilation is necessary
b. less CO_2 need be formed in the cells
*c. the blood should contain a greater quantity of hemoglobin
d. a faster heartbeat to transport the capacity of O_2
e. thinner blood for ease of circulation

B
5
P .37

Cor.I.07
Cor.X.19

8. If a person were to breathe air containing 50 percent oxygen for a period of 5 minutes, which symptom(s) would he begin to exhibit?

a. breathing rate would increase
b. breathing rate would decrease
c. suffer from a headache
d. a and c
*e. b and c

C
7
P .88

Cor.I.31
Cor.X.18

1. A man has contracted a disease which has left his chest muscles and diaphragm with no contractile ability. Which of the following might be the result of such a disease?

*a. the man would die of suffocation unless some artificial device could take over the chest and diaphragm's pumping job
b. the patient's breathing mechanism would not be affected because the diaphragm is merely the floor of the chest cavity
c. the lungs would continue their inhalation and exhalation on their own
d. the chest wall and ribs would continue the pumping process

C
6
P .71

Cor.I.05
Cor.X-.01

2. Why does a victim who has the thoracic cavity punctured accidentally have difficulty breathing?

a. too much carbon dioxide enters the lung area
b. internal pressure decreases and the air from the outside rushes into the lungs
*c. loss of internal pressure changes results in less air entering the lungs
d. the capillaries in the air sacs can't adjust to the changes

C
7
P .25

Cor.I.16
Cor.X-.02

3. The significance of the bends which both deep sea divers and astronauts encounter is related to the fact that

a. enzymes only work under pressure
b. they both must wear pressure suits
c. water and space both lack oxygen
*d. gasses are more soluble when under pressure
e. none of the above

C
6
P .39

Cor.I.53
Cor.X.22

4. A man going from sea level to high altitude would have to adapt to this change. Which of the following would you least expect to take place?

a. increase red blood cells
b. increase in hemoglobin
*c. increase in white blood cells
d. increase in respiratory rate
e. increase in respiratory volume

CHAPTER XXIII

D 1. Increased endurance of athletics trained in mountainous areas
4 could be due to
P .23

*a. increased red blood cell count
Cor.I.28 b. increased white blood cell count
Cor.X.08 c. faster heart beat
d. increased lung capacity

D 2. Breathing is a mechanical process which provides air for
6 respiration. What systems of the human organism are directly
P .63 responsible for breathing?

Cor.I.30 a. nervous system and digestive system
Cor.X.06 b. endocrine system and skeletal system
*c. muscular system and skeletal system
d. muscular system and excretory system

CHAPTER XXIV

A
7
P .45

Cor.I.34
Cor.X.17

1. Metabolic activity produces many waste products which must be removed from the organism. Which of the following is true?

   a. carbon dioxide is removed by kidney
   b. water is removed by lungs
   c. ammonia is removed by large intestine
   *d. urea is removed by nephrons
   e. uric acid is removed by ureter

A
8
P .76

Cor.I.38
Cor.X.01

2. The tiny tubes in the human kidney for extracting waste materials form the blood are called

   a. nephridia
   b. flame cells
   *c. nephrons
   d. malpighian tubules

A
8
P .96

Cor.I.26
Cor.X.11

3. Getting rid of salt and water in perspiration is an example of

   a. ingestion
   b. digestion
   c. assimilation
   d. absorption
   *e. excretion

A
8
P .72

Cor.I.40
Cor.X.27

4. Nephridia is to an earthworm as ________ is to a grasshopper

   a. flame cells
   *b. malpighian tubes
   c. contractile vacuoles
   d. ammonia
   e. uric acid

A
8
P .38

Cor.I.23
Cor.X.33

5. In desert animals one would expect nitrogen wastes to be escreted in the form of

   a. ammonia
   b. amino acids
   c. urea
   *d. uric acid
   e. nitrogen

A
8
P .64

Cor.I.24
Cor.X.14

6. The essential substance required by the body are returned to the blood in the capillaries which surround the nephron tubules, by

   a. filtration
   *b. reabsorption
   c. secretion
   d. excretion
   e. egestion

A
6
P .61

Cor.I.48
Cor.X.30

7. The structure that extracts nitrogenous wastes in planaria is the

a. contractile vacuole
*b. flame cell
c. ureter
d. excretory tublule of the nephridium

CHAPTER XXIV

B
4
P .37
Cor.I.23
Cor.X.25

1. What do we know about the environment of animals which excrete ammonia?

a. nocturnal
b. diurnal
c. small size
*d. aquatic
e. terrestrial

B
7
P .55
Cor.I.18
Cor.X.22

2. Excretory and circulatory systems are related in

a. structure
*b. homeostatic control
c. number of organs present
d. none of these

B
7
P .32
Cor.I-.03
Cor.X-.09

3. The significance to homeostasis of the ability of the liver in mammals to deaminize amino acids is

a. uric acid is formed and excreted as a solid waste material in large quantities and this aids in maintaining a constant environment
*b. that the products resulting from deaminization can then enter the ormithine cycle and evenutally urea can be formed and excreted thus aiding in maintaining a nitrogen balance in the body
c. that the products resulting from deaminization then enter the blood stream, are carried to the kidney where all the products are reabsorbed by the tubules of the kidney, thus aiding in maintaining a constant level of amino acids in the blood
d. none of the above are of any significance

CHAPTER XXIV

D
7
P .69
Cor.I.38
Cor.X.17

1. A protozoan which infects the European corn borer attacks the malphigian tubes of the host. Death of the host could possibly be due to

*a. uremic poisoning
b. blood clotting
c. respiratory failure
d. starvation

D
9
P .66
Cor.I.28
Cor.X.35

2. What is the significance of animal excretory products to plant growth?

a. protozoa feed on animal waste
b. urea prevents the growth of bacteria
c. barnyard fertilizer inhibits plant growth
*d. nitrogenous wastes ultimately are used to make proteins
e. carbon dioxide inhibits plant growth

D
7
P .62
Cor.I.28
Cor.X.14

3. We find that a small rat excretes uric acid crystals as its major nitrogenous waste product. We could deduce that it lives

a. along the seashore
b. in the tropics
c. on the shore of a freshwater lake
*d. in a desert
e. in the buildings of humans

CHAPTER XXV

A
8
P .70

Cor.I.19
Cor.X.12

1. The central nervous system is made up of

a. receptors and effectors
b. receptors only
c. receptors and the brain
*d. brain and spinal cord
e. effectors and spinal cord

A
8
P .67

Cor.I.32
Cor.X.32

2. A sense organ is specialized to receive

a. many types of stimuli
*b. specific types of stimuli
c. most changes in the environment
d. coordinated stimuli

A
8
P .17

Cor.I.22
Cor.X.17

3. Insulin was first isolated by

*a. Banting and Best
b. Loewis and Langerhans
c. Mathaei and Malpighi
d. Linnaeus and Lederberg
e. Koch and Kolbe

A
8
P .52

Cor.I.21
Cor.X.19

4. Neurons differ from one another in

a. having nuclei
b. having dendrites
c. having axons
d. being composed of protoplasm
*e. size and shape

A
8
P .51

Cor.I.10
Cor.X.06

5. The largest part of the human brain is called the

a. cerebellum
b. pons
c. medulla
*d. cerebrum

A
8
P .73

Cor.I.06
Cor.X.06

6. Which of the following endocrine glands could a person live without most efficiently?

a. islets of langerhans
b. pituitary gland
*c. reproductive glands
d. adrenal glands

A
5
P .86

Cor.I.12
Cor.X.09

7. We know that the sea anemone is an animal because

a. it moves about freely
b. it has a backbone
c. it has very little chlorophyll
*d. it has a type of nervous system

A
8
P .56

Cor.I.13
Cor.X.12

8. Diabetes is caused by the improper functioning of what gland?

a. pituitary
b. thyroid
c. adrenal
*d. pancreas
e. pineal

A
8
P .71

Cor.I.46
Cor.X.28

9. Sensory nerves

*a. carry nerve impulses from receptors to the central nervous system
b. carry nerve impulses from the central nervous system to the effectors
c. move the muscles of the body
d. have more than one axon

A
6
P .49

Cor.I.28
Cor.X.38

10. A boy of 14 reached a height of seven feet. This was caused by an oversecretion of which gland?

a. thyroid
b. adrenals
c. islets of langerhans
*d. pituitary

A
8
P .61

Cor.I.31
Cor.X.09

11. Removal of the pancreas would affect the activity of

a. menstrual cycle
b. uterine activity
c. ovulation
*d. sugar metabolism
e. none of these

A
8
P .69

Cor.I.32
Cor.X.38

12. A nerve cell is called a

a. dendrite
b. synapse
*c. neuron
d. axon
e. impulse

A
8
P .85

Cor.I.20
Cor.X-.03

13. Which one of the following activities is not associated with the cerebrum?

a. hearing
b. speech
*c. heartbeat
d. memory
e. sight

A
8
P .44

Cor.I.50
Cor.X.41

14. The system in the body that uses the blood stream to transport its secretions throughout the body is

a. digestive
*b. endocrine
c. nervous
d. respiratory
e. circulatory

A
8
P .67

Cor.I.02
Cor.X-.02

15. The system in the body that controls our behavior is

a. digestive
b. endocrine
c. circulatory
*d. nervous
e. reproductive

A
6
P .96

Cor.I.26
Cor.X.14

16. The terms receptors, neurons, synapse and effectors are associated with which of the following?

a. circulatory system
b. excretory system
c. digestive system
d. respiratory system
*e. nervous system

A
7
P .83

Cor.I.40
Cor.X.31

17. Abnormal functioning of the islets of langerhans in the pancreas produces the disease known as diabetes. Which of the following hormones is necessary to prevent this disease?

a. thyroxin
b. adrenaline
c. pituitarin
*d. insulin
e. testosterone

A
7
P .85

Cor.I.20
Cor.X.08

18. Von Wering's observations on dogs eventually led to the present day test for diabetes. A doctor would suspect the disease if he found the following substance in the patient's urine

a. uric acid
b. sodium chloride
c. albumin
*d. sugar
e. blood cells

A
8
P .68

Cor.I.39
Cor.X.25

19. The gap between the end of one neuron and the beginning of another is called the

*a. synapse
b. effector
c. receptor
d. reflex arc
e. none of these

A
8
P .65

Cor.I.49
Cor.X.37

20. The gland that secretes material to regulate the rate of metabolism is

- *a. thyroid gland
- b. adrenal gland
- c. pituitary gland
- d. islet of langerhans
- e. none of these

A
2
P .18

Cor.I-.04
Cor.X-.13

21. The structure of the nervous system of a planaria is not the same as man's nervous system. Select a statement that illustrates a difference in the two systems

- *a. nerves are a bundle of neurons
- b. brain is in the head
- c. sensory neurons
- d. nerve ladder
- e. central nervous system

A
8
P .74

Cor.I.20
Cor.X.19

22. One endocrine gland was removed from the body. As a result of this, the thyroid did not function normally. The gland removed was the

- a. pancreas
- *b. pituitary
- c. ovaries
- d. testes

The next two questions relate to the following statements: A biology teacher destroyed the brain of a frog and then touched the frog's back with acid. A hind leg jerked up and scratched the point where the acid had been applied. After washing off the acid, he destroyed the frog's spinal cord. He again used a drop of acid applied to the back; this time no reaction took place.

A
8
P .57

Cor.I.11
Cor.X.18

23. The incoming neuron which received the impulse from the skin was

- *a. a sensory neuron
- b. a motor neuron
- c. a central neuron
- d. an associative neuron

A
8
P .05

Cor.I.07
Cor.X-.01

24. The part of the incoming neurmn that received the impulse was the

- a. cell body
- b. ganglion
- c. axon
- *d. dendrites

CHAPTER XXV

B
4
P .17
Cor.I-.04
Cor.X.09

1. A nerve impulse is considered to be an electro-chemical action. You are aware of the fact that you suffer neural fatigue when you have experienced a lack of sleep. Which of the following would serve as the best reason for this fatigue? Loss of

a. ATP in the cell body
*b. chemicals in the synapse
c. electrons in the neural fiber
d. the neuron sheath

B
5
P .45
Cor.I.08
Cor.X.14

2. If a person swings at your face with his fist your first reaction representing a reflex act would be

a. striking back
b. ducking
*c. blinking
d. voicing disapproval

B
6
P .29
Cor.I.17
Cor.X.17

3. If the vagus nerve is stimulated it will cause the

a. heart to speed up
*b. heart to slow down
c. heart to stop
d. heart to beat irregularly
e. heart to remain the same

B
5
P .46
Cor.I.15
Cor.X.07

4. Loewi's experiment with the frog heart proved that a substance acetylcholine slowed down the heart's contraction rate while adrenaline also secreted by the ends of neurons stimulated the pacemaker. The adrenal glands found on the kidneys also secrete adrenaline. What hypothesis can be drawn from this?

a. the adrenals just happen to produce the same kind of substance but there is no connection between neurons and adrenaline secretion in the adrenal gland
*b. the area of the adrenal gland which secrete adrenaline should be found to be composed of modified groups of these neurons
c. no hypothesis can be drawn from this knowledge
d. a number of endocrine glands must secrete the same substances

B
5
P .86
Cor.I.11
Cor.X.15

5. A person is seriously overweight. The most likely reason is a malfunction of the

a. respiratory system
b. excretory system
c. circulatory system
*d. endocrine gland system
e. nervous system

B
6
P .65

Cor.I.40
Cor.X.27

6. A person is seriously overweight. A physician would most likely prescribe

a. a carbohydrate free diet
b. start smoking
c. five hours sleep nightly
d. antibiotics
*e. hormone treatment

B
8
P .62

Cor.I.44
Cor.X.41

7. If medical tests show that my body is not using calcium properly, what gland is probably not functioning properly?

*a. parathyroid gland
b. adrenal gland
c. pituitary gland
d. adrenal medulla
e. none of these

B
8
P .45

Cor.I.44
Cor.X.23

8. A child had a great deal of trouble in reading because most of the words appeared backwards to him. What part of his body was the probable cause of this defect?

a. lens of the eye
b. muscle of the eye
*c. the cerebrum
d. the cerebellum

B
5
P .45

Cor.I.05
Cor.X.16

9. Many times when a patient in a hospital suddenly has his heart stop, the physician will inject adrenalin directly into the heart muscle. Which of the following is the best reason for the injection of adrenalin?

a. adrenalin stimulates the nerve endings in the heart
b. adrenalin is a chemical which will do the same job of stimulation of the heart as the natural heart stimulant
*c. adrenalin is normally secreted by nerve endings which stimulate heart action
d. adrenalin reacts with acetylcholine to stimulate heart action

B
6
P .44

Cor.I.40
Cor.X.37

10. A nerve in a frog's leg was cut and each severed end stimulated electrically. The only reaction observed in the frog to this stimulation was a twitching of the muscles in that same leg. The frog apparently was not affected in any other way. One should conclude that the nerve was most likely

*a. purely motor
b. mixed motor and sensory
c. purely sensory
d. partially autonomic

B
5
P .74

Cor.I.17
Cor.X.17

11. A dog and a frog sitting on the brink of a 100 foot cliff are both unsuspectingly touched on the back. The frog jumps headlong into the canyon below, but the dog recovers from his surprise in time to stop his first impulse to jump blindly forward. The difference in response of these two animals to the same stimulus can be explained, at least in part, by the fact that

a. the dog possesses an endocrine system, while the frog does not
*b. the dog has a more complex cerebrum
c. the dog's behavior is instinctive, while the frog's behavior is rational
d. the dog would be more likely to get hurt by a 100 foot fall than would the frog

The next three questions relate to the following case:

A young pilot who was flying alone for the first time at night suddenly realized that one engine was not operating properly. Though he became excited, he landed safely by following the directions he had practiced so many times.

B
5
P .45

Cor.I.11
Cor.X.01

12. The pilot was able to land the plane safely because through practice he had developed

a. slower reaction time
b. faster inborn responses
c. reflexes
*d. habits

B
5
P .47

Cor.I.27
Cor.X.22

13. The part of the brain that let him realize that one motor was not operating properly was the

a. medulla
*b. cerebrum
c. midbrain
d. cerebellum

B
7
P .90

Cor.I.32
Cor.X.36

14. A hormone that increased greatly in the pilot's bloodstream when he became excited was

a. parathyroid secretion
b. pituitary hormone
c. secretin
*d. adrenalin

B
8
P .20

Cor.I.17
Cor.X.20

15. If you were testing the spread or range of a frog's nerve impulse, what item would be essential?

a. acetylcholine
b. adrenalin
*c. electricity
d. all of the above

B
7
P .43

Cor.I.14
Cor.X.19

16. The function of a paritcular gland that was being studied was to stimulate the secretion of an associated organ. The nerves connecting with the associated organ were severed but the organ continued to be stimulated. Probably the stimulation was due to

a. a chemical secreted by the nerve endings
b. a hormone secreted by the nerve endings
*c. a hormone secreted by the gland being studied
d. an impulse orignating within the nervous system

CHAPTER XXV

C
6
P .52

Cor.I.09
Cor.X.13

1. If an accident occured and the medulla oblongata were injured which would not be a consequence?

   a. the breathing center would be affected
   b. there would be improper balance between the relative concentration of carbon dioxide and oxygen in the blood
   c. the diaphragm and rib muscles would fail to coordinate and breathing would be irregular
   *d. man's reflexes would be affected

C
6
P .41

Cor.I.20
Cor.X.24

2. It is thought that the thyroid gland regulates the metabolism. Which of the following would *not* substantiate this belief?

   a. when the thyroid is removed obesity usually occurs
   b. when the thyroid is removed the growth rate is greatly decreased
   *c. when the thyroid is removed development of the ovaries and testes is affected
   d. when the thyroid is removed metabolism is slowed down and the activity rate is greatly decreased

C
8
P .78

Cor.I.20
Cor.X.15

3. A biology teacher destroyed the *brain* of a frog and then touched the frog's back with acid. A hind leg jerked up and scratched the point where the acid has been applied. After washing off the acid, he destroyed the frog's *spinal* cord. He again used a drop of acid applied to the back; this time no reaction took place.

   From this experiment the students learned that in frogs the scratch reflex

   a. requires a cranial nerve
   b. is a learned response
   c. requires the brain
   *d. is centered in the spinal cord

C
7
P .43

Cor.I.33
Cor.X.22

4. A friend has a daughter who is two years old. The child seems in normal health. However, in the last two weeks a marked change has taken place. She has started drinking excessive amounts of water and has been urinating excessively. With this information you would suspect that

   *a. there might be glucose in the urine
   b. the child's mother has diabetes mellitus
   c. the pancreas is producing excessive insulin
   d. nothing is wrong
   e. enzymes are at work

C
7
P .50

Cor.I.27
Cor.X.12

5. After a trip to the doctor, you aren't surprised to hear that the child

   a. is all right
   *b. will need insulin
   c. has an enlarged liver
   d. has an excess of proteins in the urine
   e. has no glucose in the urine

C
6
P .53

Cor.I.37
Cor.X.26

6. A female was found to have an excess of testosterone in her system. She properly could

a. not bear children
*b. show some male characteristics
c. not reach maturity
d. produce only male children

CHAPTER XXV

D
1
P .78

Cor.I.24
Cor.X.11

1. From the information that you have gained from these four chapters on (transportation-respiration-excretion-and the nervous system) you would select which of the following as being the correct order of evolutionary development - from simple to more complex organisms

a. hydra - grasshopper - paramecium
b. paramecium - hydra - man - grasshopper
*c. hydra - earthworm - grasshopper - man
d. none of the above are correct

D
6
P .69

Cor.I.45
Cor.X.30

2. A dentist was having the calcium content of a boy tested as he had poorly developed teeth. The clacium content was low, the dentist would most likely conclude that the following gland wasn't functioning

a. adrenal
b. testes
*c. parathyroid
d. thyroid
e. pituitary

D
6
P .31

Cor.I.15
Cor.X.10

3. The fatty sheath surrounding nerve fibers serve as

a. means of protection
*b. insulation
c. producer of acetylcholine
d. sodium pump

CHAPTER XXVI

A
8
P .62 1. Which of the following refers to locomotion in the protozoa?

a. flagella
b. jet propulsion
Cor.I.24 c. pseudopodia
Cor.X.16 *d. a and c

A
8 2. Animals capable of locomotion are said to be
P .97 *a. motile
b. tactile
Cor.I.26 c. sessile
Cor.X.14 d. distal

A
8 3. An example of an animal with an exoskeleton is
P .81 a. turtle
b. earthworm
Cor.I.24 * c. lobster
Cor.X.22 d. lizard

A 4. In skin diving with a friend last summer, you noticed more sessile than motile animals. This means that you saw
8
P .94 a. more animals capable of locomotion
Cor.I.51 *b. more animals which remain attached to one place
Cor.X.31 c. more animals with tentacles
d. more animals without tentacles
e. more animals with bilateral symmetry

A 5. O_2 = lactic acid = glycogen → creatine P + ADP →
9 From the above formula — select the ATP + creatine portion which best supports the following statements
P .21
Cor.I.11 a. energy for contraction
Cor.X.08 *b. recovery only
c. energy for resynthesis
d. catabolic only

A 6. The relationship between invertebrate movements and vertebrate movements is shown by
2
P .58 a. the fact that both have endoskeletons
Cor.I.13 b. muscles are always attached to bones
Cor.X.02 *c. striated muscles are found in both vertebrates and invertebrates
d. the muscles of the starfish for pulling a clam shell open are much the same as those in the jumping legs of a rabbit

A 7. An example of a sessile animal is a
4
P .66 a. jellyfish (coelenterate)
*b. sea squirt (tunicate)
Cor.I.45 c. porpoise (mammal)
Cor.X.35 d. sea star (echinoderm)

CHAPTER XXVI

A
6
P .77

Cor.I.44
Cor.X.37

8. Which is not a kind of muscle?

a. skeletal
b. smooth
*c. myosin
d. flexor
e. cardiac

A
6
P .86

Cor.I.32
Cor.X.20

9. Where is the general place of attachment for skeletal muscles?

a. nerve tissue
*b. bones
c. heart
d. internal organs
e. epidermis

A
6
P .81

Cor.I.25
Cor.X.09

10. From reading your text you could observe that

a. all vertebrates can move rapidly
*b. for every extensor muscle there is a flexor
c. lactic acid is important muscle food
d. large animals can only have exoskeletons

A
7
P .47

Cor.I.40
Cor.X.09

11. Energy for muscle contraction comes from the breakdowns of glycogen to lactic acid in the absence of oxygen. However, even in the presence of oxygen only one fifth of the lactic acid is oxidized to CO_2 and H_2O. The remainder is

*a. returned to glycogen
b. converted to simple sugars
c. transferred to the citric acid cycle
d. oxidized to alcohol

A
6
P .80

Cor.I.25
Cor.X.13

12. The presence of a skeleton in animals is related to locomotion in which of the following ways?

a. it gives strength to the body
b. it permits alternate contractions of longitudinal and circular muscles
c. it protects most of the internal organs
*d. it allows for attachment of muscles making locomotion more rapid and effective than in organisms lacking skeletons

A
7
P .19

Cor.I.35
Cor.X.28

13. The chemistry of muscle action shows homeostatic capacity because

a. the energy for contraction is supplied by ATP
*b. of the way in which lactic acid is oxidized in the recovery mechanism of muscle cells
c. of the "all-or none" principle of muscle contraction
d. of the way in which the actin filaments are attached to the Z bands
e. of the way in which nerve impulses activate a muscle

A
9
P .85

Cor.I.18
Cor.X.07

14. Which of the following needs the stronger backbone?

a. amphibian
b. reptile
*c. mammals
d. fish
e. none of these

CHAPTER XXVI

B
4
P .79
Cor.I.22
Cor.X.05

1. If man had become adapted to the ocean
   - *a. his hands and arms would have become fin-like
   - b. his brain would have become smaller
   - c. he would probably be herbivorous
   - d. he would have developed a type of reproduction known as isogamy

B
7
P .56
Cor.I.17
Cor.X.20

2. When a muscle becomes fatigued and incapable of further contraction which of the following would best represent the condition of the fatigued muscle?
   - *a. there is little or no ATP, little glycogen, and much lactic acid
   - b. much lactic acid, much ATP, and much glycogen
   - c. little lactic acid, little ATP, and much glycogen
   - d. a condition in the muscle not described above in a, b, or c

B
7
P .27
Cor.I.12
Cor.X.12

3. During the "recovery phase" after muscle contraction which of the following has the greatest value for an abundance of ATP being generated later?
   - a. the accumulation of lactic acid in the muscle fibers
   - *b. the oxidization of lactic acid
   - c. the reserve supply of glycogen in the muscle
   - d. the transport of glucose by the blood to the muscle

B
6
P .20
Cor.I-.17
Cor.X-.07

4. What is the relationship between body shape and food getting in animals?
   - a. sessile animals are usually radially symmetrical
   - b. sessile animals are usually bilaterally symmetrical
   - c. sessile animals may assume any shape
   - *d. sessile animals are either radially symmetrical or bilaterally symmetrical

B
7
P .40
Cor.I.01
Cor.X-.10

5. No animal is sessile during its entire life. It must be motile at some age in order to
   - a. find mates
   - *b. insure proper distribution of the species
   - c. get food
   - d. create future generations

B
9
P .76
Cor.I.16
Cor.X.08

6. You have probably noticed that ants are capable of lifting and carrying loads more than twice their own size whereas man with much larger muscles comparatively speaking can carry loads less than half their own size. Which of the following might account for this fact?
   - a. exoskeletons protect the internal muscles better
   - b. the ant's muscle is more efficient than man's
   - *c. the physical attachment of an ant's muscle provides for heavier lifting power
   - d. the physical attachment of a man's muscle provides for more efficient lifting power

B
9
P .40

Cor.I.20
Cor.X.14

7. If the actin and myosin molecules only slide over each other, how do we account for the large size of a muscle during contraction?

- a. z band position changes
- b. can't account for this -- too little data
- *c. the actin and myosin bands are brought in line under each other giving greater thickness
- d. as the fibrils are brought together they shorten, therefore making the long fibers (relaxed state) bend or curve (swell)
- e. all fibers (z, actin, myosin) move from a rectangle shape to a square

B
9
P .34

Cor.I.14
Cor.X.21

8. Higher forms of animals have interlocking vertebrae but nevertheless they have been the dominant land form. How do you think they have done this?

- *a. intelligence
- b. muscles
- c. brachistion
- d. reproduction
- e. regeneration

B
6
P .78

Cor.I.11
Cor.X.13

9. Of what advantage is segmentation to the grasshopper?

- a. provides for a place for attachment of appendages
- *b. allows for greater flexibility for movement
- c. allows for a greater number of internal organs
- d. helps to section the body cavity

CHAPTER XXVI

C 1. A crab was fossilized during molting. The scientist found

2

P .19 a. a shell

*b. no skeleton

Cor.I.26 c. an endoskeleton

Cor.X.21 d. an exoskeleton

e. a crab, as it doesn't molt

D
2
P .21

Cor.I.10
Cor.X-.03

1. The muscle under the upper part of the arm was removed. We can conclude that

   a. the arm was lifeless
   *b. the arm below the elbow could be raised only
   c. the arm below the elbow could be lowered only
   d. none of these

CHAPTER XXVII

A 1. Higher animals reproduce by the union of
3
P .91 a. asexual spores
b. two similar gametes
Cor.I.27 c. four sperms with one egg
Cor.X.01 d. one sperm with more than one egg
*e. one sperm one egg

A 2. Asexual reproduction occurs in all of these except
3
P .46 a. hydra
b. paramecium
Cor.I.40 c. man
Cor.X.31 *d. earthworm
e. amoeba

A 3. In the reproductive cycle of the land-living animals there
4 is always
P .61
a. metamorphosis
Cor.I.15 b. parthenogensis
Cor.X.03 *c. internal fertilization
d. development of eggs with a protective shell

A 4. The male reproductive organs of a vertebrate are the
6
P .92 a. secondary sex characteristics
b. ovaries
Cor.I.23 *c. testes
Cor.X.22 d. sperm

A 5. A Duckbill platypus is classed as a mammal even though it
2 lays eggs, the reason is
P .91
a. its eggs are totally unlike reptile and bird eggs
Cor.I.39 b. its beak is not really like a ducks and it has fur instead
Cor.X.12 of feathers
*c. it furnishes its young with food from mammary glands
d. it is warm blooded

A 6. Animals that have both male and female organs in the same
8 individual are called
P .64
a. parthenogenic
Cor.I.32 *b. hermaphroditic
Cor.X.19 c. allantoic
d. marsupials

A 7. In organisms with internal fertilization the following would
7 be correct
P .81
a. the female of the species produces thousands of eggs
Cor.I.30 b. fertilization is not very likely to occur
Cor.X.00 *c. many more sperm than eggs are produced
d. none of the above are correct

A 8. Which of the following does not possess sexual reproduction?
7
P .53 a. paramecium
*b. amoeba
Cor.I.12 c. hydra
Cor.X.04 d. earthworm

A 9. In humans, generally only one egg cell is released from the ovary at a time. However, in many animals, hundreds and even thousands of eggs are released at a time. Which of the following may account for this?
7
P .69
Cor.I.24
Cor.X.11 a. greater protection and care for the young is given by humans than by some animals
b. chances for fertilization of an egg cell is greater in humans than in some animals
c. human beings do not have as many natural enemies as some animals
d. a human being's chances for survival are greater than some animals
*e. all of the above

A 10. Which of the following is a type of sexual reproduction?
8
P .55 a. parthenogenesis
*b. conjugation
Cor.I.28 c. multiple fission
Cor.X.05 d. budding

A 11. A group of animals that pass through stages of uterine activity are
8
P .86
a. amphibians
Cor.I.30 b. birds
Cor.X.13 c. reptiles
*d. mammals

A 12. In placental animals
8
P .39 a. the mother's blood circulates freely by way of the umbilical cord through the blood vessels of the fetus
Cor.I.42 *b. the eggs are minute, possess very little yolk, and are retained within the mother's body for development
Cor.X.41
c. only one offspring can develop in one gestation period
d. the eggs, which contain much yolk, develop into young within the oviducts of the mother's body
e. the young are born in a premature state and must undergo further development within a pouch where they are nourished and protected

CHAPTER XXVII

A
1
P .48
Cor.I.32
Cor.X.21

13. The main reason for the success of the land animals is their

a. ability to move swiftly
*b. ability to keep their sperm moist
c. high intelligence
d. powerful jaws

A
5
P .45
Cor.I.41
Cor.X.28

14. Male deer have antlers, roosters have heavier combs than hens, male birds have striking differences in colors. This condition is due to

a. hermaphroditism
b. thyroxin
c. pituitarin
d. estrogen
*e. testosterone

A
8
P .85
Cor.I.51
Cor.X.34

15. In the human male, the two testes are located in an outpocketing of the body wall, called

a. placenta
*b. scrotum
c. oviducts
d. pouch

A
8
P .30
Cor.I.36
Cor.X.23

16. All asexual reproduction is characterized by

a. meiosis
b. fusion of sperm and egg
*c. lack of meiosis
d. mitosis
e. budding

A
8
P .75
Cor.I.36
Cor.X.15

17. Another name for the sex cells is

a. sperms
*b. gametes
c. zygotes
d. eggs
e. follicles

A
8
P .36
Cor.I-.03
Cor.X.06

18. An example of an animal which is hermaphroditic is

a. bird
*b. planaria
c. roundworm
d. crayfish

A
2
P .71
Cor.I.59
Cor.X.32

19. Human sperms and eggs are similar in which of the following respects?

a. they have approximately the same mass of material in one cell
b. about the same number of each is produced
c. they are both motile
*d. they have the same number of chromosomes in their nuclei
e. they are both produced by ovulation

A
1
P .64
Cor.I.40
Cor.X.40

20. Which type of reproduction would produce the most variation in a protozoa?

*a. sexual
b. asexual
c. budding
d. binary fission
e. sporulation

A
9
P .11
Cor.I-.02
Cor.X-.15

21. Why would it be impractical for a mammal to give birth to numerous offspring at one time?

a. it would cause over-population of the species
b. it would too greatly weaken the mother
*c. the mother could not care for all the young
d. all of the above

A
8
P .52
Cor.I.30
Cor.X.05

22. Choose the best statement describing forms of reproduction in paramecia

a. asexual budding or regeneration only
b. longitudinal fission and mitosis
*c. transverse fission and conjugation
d. transverse fission only

A
8
P .36
Cor.I.13
Cor.X.01

23. Reproduction in mammals by placenta seems to be the most advanced stage of reproduction. Which of the following would tend to prove that this is so?

a. placental births are generally few in number
b. animals developed in placenta are more advanced at birth
*c. animals developed in placenta are more complex organisms than those hatched from eggs
d. animals protected by internal development in the placenta are the only ones to have amnion, allantios and chorion tissues

A
1
P .84
Cor.I.39
Cor.X.26

24. All animals reproduce to

*a. preserve the species
b. produce new species
c. increase in number
d. keep a balance in the food cycle

CHAPTER XXVII

B
6
P .21

Cor.I.02
Cor.X-.16

1. Which one of the following is the most likely reason why a frog's egg does not have an allantois while a hen's egg does have an allantois?

   a. the frog is more highly developed than the hen
   *b. the hen's egg has a shell while the frogs egg does not have a shell
   c. developing chicks are larger than developing frogs
   d. frogs eggs develop in water while hen's eggs do not

B
7
P .26

Cor.I.25
Cor.X.20

2. During pregnancy, some diseases contracted by the mother may have an effect on the fetus. Which of the following may account for this?

   a. blood from the mother carrying disease organisms probably has flowed into the blood of the fetus
   *b. the disease causing organisms or substances produced by them may have entered the fetus by diffusion through the placenta
   c. the disease causing organisms or substances probably entered the baby through the digestive system of the mother
   d. none of the above choices are probable

B
3
P .47

Cor.I.44
Cor.X.36

3. Although two cells unite in the process of fertilization, why has the zygote generally no more chromosomes than the number typical of the body cells of the parents or of their offspring?

   *a. meiosis occurs during the process of gametogenesis
   b. in parthenogensis eggs develop which have not united with a sperm
   c. cleavage occurs following the fertilization of an egg by a sperm
   d. sperms contain fewer chromosomes than the eggs
   e. mitosis occurs during the process of gametogenesis

B
3
P .59

Cor.I.19
Cor.X.02

4. The average period of labor for a first child is about twenty hours. If, during the actual birth, the placenta and accompanying tissues, called "afterbirth" were "born" first rather than last, which would be most likely to happen?

   a. the baby would die
   b. the baby would live because it doesn't matter which comes first
   c. the baby would bleed to death
   *d. the baby would die of suffocation if it were not born immediately

B
4
P .29

Cor.I.17
Cor.X.26

5. Why is internal fertilization an evolutionary success in higher land animals?

   a. timing is not important
   b. more gametes are produced
   c. fertilization always occurs
   *d. moisture is abundant
   e. mammary glands nourish the newborn animals

B
1
P .69

Cor.I.23
Cor.X.10

6. Sexual reproduction is more important to evolution than asexual reproduction because it

- *a. allows greater recombination of genes
- b. serves better to perpetuate the species
- c. allows offspring identical to parents
- d. ensures less variety in genetic types
- e. always produces diploid individuals

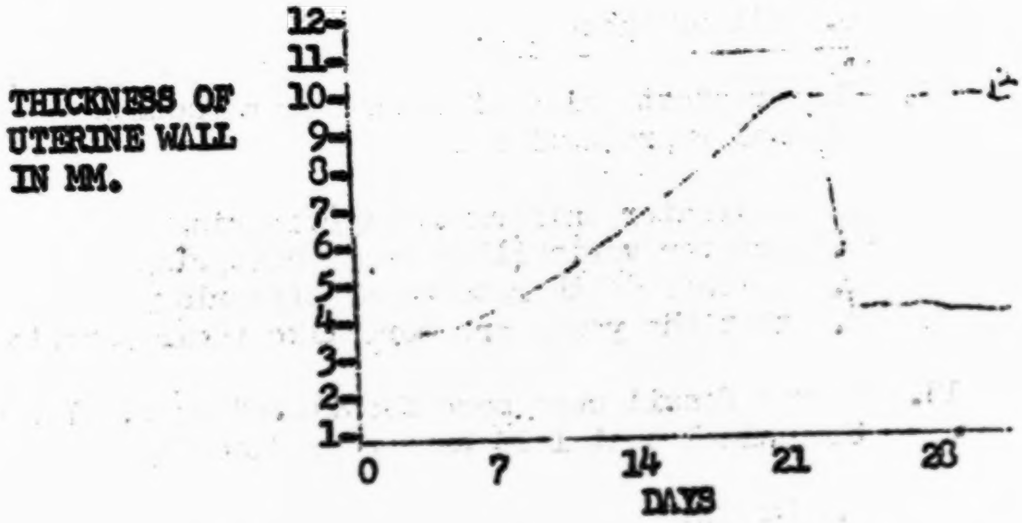
B
1
P .47

Cor.I.36
Cor.X.32

7. An insignificant factor in the relationship between internal development and evolutionary success of the higher land animals is

- *a. fewer numbers of offspring are produced
- b. embryo is protected from distruction
- c. embryo is nourished
- d. embryo is provided with adequate temperature
- e. embryo is provided with adequate moisture

The graph below refers to question number 8



B
7
P .21

Cor.I.07
Cor.X.11

8. Line B would be expected if

- a. fertilization occurred
- b. progesterone decreased
- c. corpus luteum degenerated
- *d. attachment occurred

B
2
P .20

Cor.I.10
Cor.X.08

9. Which one of the following constitutes the best reason as to why the fish can be distinguished at an early state from the human embryo, whereas the pig cannot be distinguished until a later stage?

- a. the fish shows adaptation for living in water
- *b. the fish are widely removed from man whereas the pig and man may have a more recent common ancestor
- c. the fish has no limbs for land locomotion
- d. the fish are in the class Pisces whereas, the pig is in the class Mammalia
- e. fish develop scales, fins, and laterally placed eyes, whereas the pig develops skin, limbs, and more nearly frontal eyes like man

B
2
P .62

Cor.I.35
Cor.X.44

10. Budding as a means of reproduction differs from fission (simple division) in that

a. budding represents asexual reproduction while fission is an example of sexual reproduction
b. in budding, a plant sends out a long, leafless stem, the tip of which takes root several feet from the parent stem
c. budding applies only to plants while fission may apply to both plants and animals
*d. the identity of the parent is maintained after budding has occurred, whereas in fission the parent divides to form two offspring

B
5
P .64

Cor.I.43
Cor.X.16

11. A woman with a beard indicates the presence of an overabundance of which type of hormone?

a. estrogens
b. progesterone
*c. testosterone
d. FSH
e. all of these

B
3
P .72

Cor.I.39
Cor.X.23

12. The greatest value of sexual reproduction as compared with asexual reproduction is

a. a greater uniformity of offspring
*b. greater variability among offspring
c. a lower death rate among offspring
d. that the young are more like their parents

B
8
P .80

Cor.I.37
Cor.X.27

13. Near a fossil were some fossilized eggs. You could say that the animal that laid them reproduced by

a. budding
b. fission
*c. sexual means
d. asexual means

B
2
P .58

Cor.I.38
Cor.X.24

14. In comparing the production of gametes in plants with the same process in animals, the structures in plants that would be most similar in function to the testes of animals would be the following

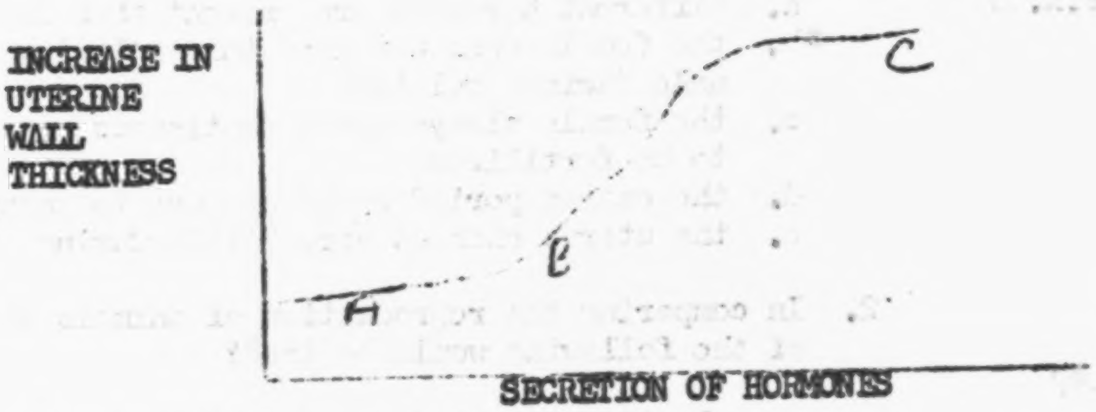
a. stigma
b. calyx
*c. anther
d. ovary
e. ovule

CHAPTER XXVII

C
7
P .20

Cor.I.14
Cor.X.00

1. Hormones produced in the pituitary and ovaries have considerable influence in the thickening of the uterine wall during the menstrual cycle. Study the graph below and indicate which of the statements is true



- a. progesterone is secreted during A
- b. much estrogen is secreted during C
- c. both FSH and LH are secreted during A
- *d. much estrogen is secreted during B

C
2
P .93

Cor.I.14
Cor.X.15

2. Menopause is caused by the

- a. pituitary not functioning
- *b. absence of ovulation
- c. female not mating
- d. none of these

C
4
P .76

Cor.I.29
Cor.X.31

3. If a developing chicken egg were covered by paraffin the effect on the embryo would be

- a. none
- *b. animal would die from suffocation
- c. more rapid development because egg would be kept warmer and bacteria could not enter
- d. development would be slowed

C
9
P .71

Cor.I.18
Cor.X.19

4. A female collie dog gave birth to five puppies. One of the puppies remained enveloped in the amnionic membrane after birth, and several hours later was dead even though it had lived and developed within this same membranous sac for many weeks prior to birth. Locate the most crucial problem pertinent to this situation

- a. how does circulation after birth differ from circulation in the embryo?
- b. how does the embryo get its food?
- *c. how does embryonic respiration differ from respiration in the puppy after birth?
- d. how does the puppy's disease resistance compare to disease resistance in the embryo stage?
- e. how does discharge of excretory waste products in the embryo differ from excretion in the puppy after birth?

CHAPTER XXVII

D
3
P .46

Cor.I-.05
Cor.X.08

1. Female animals go through a short period of estrus or heat during the mating season. This activity is used to create a mating desire during ovulation. Why has this activity decreased in humans?

   a. different hormones are present than in lower animals
   ●b. the female does not need this activity to mate with the male during ovulation
   c. the female always has a continuous supply of eggs ready to be fertilized
   d. the estrus period would produce too many hormones
   e. the uterus changes very little during ovulation

D
2
P .47

Cor.I.28
Cor.X.30

2. In comparing the reproduction of animals with plants, which of the following would be true?

   a. plants can reproduce asexually, whereas animals cannot
   b. differentiation does not occur in plants
   c. sexual reproduction does not occur in plants
   *d. reproduction in most respects is very similar in plants and animals

CHAPTER XXVIII

A 1. From which embryonic layer does the heart arise?
3
P .34 a. endoderm and ectoderm
b. endoderm
Cor.I.26 c. ectoderm
Cor.X.32 d. mesoderm and endoderm
*e. mesoderm

A 2. The process by which many different kinds of tissue cells
3 are produced from a fertilized egg is called
P .45
a. metamorphosis
Cor.I.31 b. parthenogenesis
Cor.X.06 c. cleavage
*d. differentiation

A 3. Which of the following does not develop from ectoderm in an
3 embryo?
P .64
a. brain
Cor.I.23 b. ears
Cor.X.15 c. eye lens
*d. pancreas

A 4. All of the orgnas of the tadpole's body are derived from
8 three layers of cells, the ectoderm, the endoderm, and the
P .78 mesoderm. Which of the following are derived from the ectoderm?
Cor.I.35 a. digestive system
Cor.X.05 b. muscle, bone, blood tissue
*c. skin, nervous system, sense organs
d. mouth, esophagus, bone

A 5. An embryologist is studying the muscular system,and the
8 skeletal system of a salamander. He knows that those systems
P .40 were formed from
Cor.I.36 *a. mesoderm
Cor.X.13 b. ectoderm
c. endoderm
d. a and b
e. c and b

CHAPTER XXVIII

D
3
P .81

Cor.I.40
Cor.X.26

1. In the birth of human quintuplets there were identical twins and identical triplets. This would indicate that

   a. only one egg was fertilized by three sperms and the egg then had undergone five complete divisions
   *b. two eggs were fertilized: one giving rise to twins and the other to triplets
   c. four eggs were fertilized: one giving rise to twins and three giving rise to triplets
   d. five eggs were fertilized, giving rise to twins and triplets

D
1
P .54

Cor.I.04
Cor.X.14

2. When the developing eggs of the common marine minnow, Fundulus, were subjected to different magnesium salts, about 60 per cent developed a single median eye rather than the normal two. Since these same results may be produced by a number of different chemical or physical means, you could conclude

   a. the response is due to a specific agent
   b. the eggs were defective to begin with
   *c. the stage of development at which the experiment was performed is significant
   d. magnesium salts will produce this result in all animals

CHAPTER XXVIII

C
1
P .72

Cor.I.40
Cor.X.10

1. The dorsal lip of the blastopore expands into the archenteron which later gives rise to the digestive canal. Then the lungs, liver and pancreas develop from walls of the digestive canal. From observation you could conclude that

   a. this is preformation
   *b. certain regions of the developing embryo may be organizers and control development of adjacent cells
   c. regeneration is a deciding factor in the development
   d. abnormal differentiation is in evidence

C
1
P .17

Cor.I.20
Cor.X.11

2. A baby was born without an alimentary canal. This was due to the non-forming of the

   a. ectoderm
   b. mesoderm
   c. endoderm
   *d. archenteron
   e. none of these

CHAPTER XXVIII

D
2
P .24

Cor.I-.17
Cor.X-.01

1. If the neural tube developed on the ventral surface of an embryo a biologist would know

   a. it is a frog
   b. it is a mammal
   *c. it is an invertebrate
   d. it is a mutation

D
2
P .46

Cor.I.24
Cor.X.32

2. Which of the following does not provide evidence of similarities among classes of vertebrates?

   a. structure of early embryos
   b. the brain
   c. the early development of vertebrates as shown by fossils
   d. habitat

D
6
P .26

Cor.I.13
Cor.X.27

3. Beneath the neural tube of ectoderm may be found a structure named the notochord. With your present knowledge, what may you deduct?

   a. the notochord is ectodermal also and along with the neural tube goes to make up part of the brain
   b. the notochord is apparently an unnecessary structure because it is not found in the adult
   *c. the notochord is composed of mesoderm and seems to induce the growth of the neural tube
   d. these data are insufficient upon which to base an assumption

CHAPTER XXIX

A
3
P .59
Cor.I.05
Cor.X-.05

1. The development of a human embryo normally depends upon

   a. genes obtained from the female parent
   b. genes obtained from the male parent
   *c. genes obtained from male and female parents
   d. factors other than genes

A
6
P .87
Cor.I.28
Cor.X-.04

2. The large amount of yolk found in birds as compared to the mammals is due to the fact that

   a. a bird embryo needs more energy
   b. a bird embryo develops in a shorter period of time as compared to mammals
   *c. bird embryos depend upon the yolk as source of food during the embryonic period
   d. the bird embryo is large and needs a great deal of yolk

A
6
P .69
Cor.I.41
Cor.X.04

3. The idea of a sperm cell of a cat already containing the organs of a kitten would be an example of

   a. spontaneous generation
   b. epigenesis
   *c. preformation
   d. embryonic induction

A
8
P .16
Cor.I.02
Cor.X.06

4. The most significant factor of embryonic mesoderm is that

   a. all vertebrates have it
   b. it contains nucleic acid which causes the nervous system to form
   *c. it is always located between the ectoderm and the endoderm
   d. it regulated the size of the brain
   e. all of these

A
8
P .18
Cor.I.19
Cor.X.12

5. Embryonic induction is an important way of explaining differentiation. Which of the following are examples of induction?

   a. Spemann's experiment of removing ectoderm from a frog egg and putting it in a separate dish where it remained healthy, but did not form a nerve tube
   *b. Niu's experiment of putting mesoderm in a salt solution, and then removing it and substituting a piece of top ectoderm, which formed a nervous system
   c. Driesch's experiment, which involved removing one of the two cells of a sea urchin's egg, and subsequent development from one of the eggs
   d. all of the above

A
8
P .69

Cor.I.29
Cor.X-.10

6. Spemann designed experiments to prove a hypothesis. In one experiment he removed mesoderm, and the ectoderm failed to form nerve tissue. In another experiment, he transferred top mesoderm from one embryo to replace bottom mesoderm in another embryo, and a brain and spinal cord developed in the belly. Which of the following hypotheses appeared to be proved by these experiments?

a. ectoderm does not need mesoderm in order to form nerve tissue
*b. mesoderm influences ectoderm to form nerve tissue
c. ectoderm will remain healthy, even though the mesoderm has been removed
d. none of the above

A
8
P .67

Cor.I.40
Cor.X.26

7. M. Niu, an American embryologist, took a piece of top mesoderm, and let it stand in a salt solution for a few hours. He then removed the mesoderm, and put in a piece of top ectoderm, which then formed a nervous system. What conclusion could be made on the basis of this experiment?

a. ectoderm will form a nervous system when placed in a salt solution
*b. mesoderm left something behind in the salt solution, which caused the ectoderm to differentiate into nerves
c. presence of mesoderm had no affect upon the ectoderm
d. mesoderm would have formed a nervous system if left in the salt solution a little longer

CHAPTER XXIX

D
8
P .25

Cor.I-.04
Cor.X.13

1. Embryonic induction refers to the effect of one germ layer upon another. Which of the following involves induction?

a. formation of digestive system from endoderm
b. formation of muscle, bone, blood vessels from mesoderm
c. formation of skin and nervous system from ectoderm
d. all of the above
*e. none of the above

D
6
P .14

Cor.I-.12
Cor.X-.21

2. In the human fetus the percentage of oxygen is lowest in the

*a. umbilical artery
b. umbilical vein
c. capillaries in muscles
d. capillaries in the brain

D
4
P .61

Cor.I.31
Cor.X.16

3. It has been suggested that aging in tissues is caused by the tissues becoming too specialized. We might find a "cure" by treating these tissues in one of the following ways

a. treatment of cells by radiation
*b. injection of nucleic acid from embryonic cells
c. injection of salt water
d. removal of old cells

D
2
P .42

Cor.I.17
Cor.X.07

4. A treatment for cancerous growths may be found in the study of embryology because

*a. both deal with multiplication of cells
b. patterns for cancer are established at fertilization
c. cancer has to do with cell differentiation
d. only abnormal development is studied in both cases
e. all animals have regenerative powers

D
6
P .62

Cor.I.14
Cor.X.02

5. Devising an experiment in tissue culture, a student removed a piece from a developing chick embryo and placed in an appropriate nutrient medium. The piece of tissue continued to develop for some time and appeared to have the general outline of a wing. One can suppose that

a. the tissue differentiation will appear greater as the tissue grows
b. a complete chick will develop
*c. the tissue will differentiate no further than the indicated possible structure
d. he was just lucky in being able to keep the tissue alive

D
8
P .60

Cor.I.47
Cor.X.13

6. Aristotle proposed two different hypotheses to account for development. One is known as preformation and the other as epigenesis. Which of the following includes both?

*a. egg contains organs already formed or organs not there at the beginning, but appear later
b. one part of the egg contains a small head, and the other side a small tail
c. organs present in the egg or organs present in the sperm
d. egg just turned into an animal or sperm just turned into an animal

CHAPTER XXIX

C
5
P .58

Cor.I-.06
Cor.X.03

1. You are studying the embryonic development of a frog. Following an embryonic induction you observe the tadpole develop two heads. What has occured?

   a. preformation
   b. epigenesis
   c. regeneration
   *d. normal differentiation

C
2
P .63

Cor.I.08
Cor.X.18

2. A cow was fertilized artificially with the sperms from a dog. The outcome was that

   a. the cow produced a dog
   b. the sperm fertilized the eggs
   c. an animal was formed with characteristics both of a dog and cow
   d. the cow produced a calf
   *e. nothing happened

C
9
P .46

Cor.I.14
Cor.X.07

3. You are told that the mesoderm cells of a transplant caused the ectoderm to form a second nervous system. You could secure evidence to support this statement by

   a. observing a normal tadpole develop
   *b. leaving the mesoderm tissue in salt water for several hours and then place the ectoderm in the water for observation
   c. leaving the ectoderm in salt water for several hours and then place the mesoderm in it for observation
   d. perform a chemical analysis of the salt solution and find it to contain enzymes

CHAPTER XXIX

D
2
P .25

Cor.I.23
Cor.X.18

1. An abnormal differentiation of cells is

   a. gene change
   *b. tumor
   c. midget
   d. all of those

D
1
P .46

Cor.I.37
Cor.X.41

2. What could be the significance of quickly multiplying cells in animals?

   a. dwarfism
   b. regeneration is assured
   *c. this action could indicate cancer
   d. overstimulation of the thyroid
   e. none of those

D
1
P .53

Cor.I.25
Cor.X.09

3. The inability of the ectoderm to differentiate into nerve tissue could be due to deficient

   a. temperature variance
   b. vegetal hemisphere development
   c. mineral salts
   *d. nucleic acid

CHAPTER XXX

A
3
P .85
Cor.I.33
Cor.X.36

1. The gene formula of an organism for a particular trait is the

*a. genotype
b. phenotype
c. heterozygote
d. homozygote
e. filial

A
3
P .58
Cor.I.39
Cor.X.17

2. What an organism looks like with a particular gene formula is the

a. allele
b. recessive
c. dominant
*d. phenotype
e. genotype

A
8
P .56
Cor.I.30
Cor.X.21

3. Gregor Mendel grew up in an agriculture district of the present day

a. Canada
b. United States
c. Italy
*d. Czechoslaovakia

A
3
P .85
Cor.I.43
Cor.X.24

4. If "R" indicates the color red an organism "RR" would be

a. homozygous recessive
b. incomplete dominance
c. heterozygous
*d. none of the above are correct

A
3
P .83
Cor.I.39
Cor.X.19

5. Seed characteristics - L=long, W=wrinkled, Y= yellow, R-ribbed, l=short, w= smooth, y = white, r=groved

A short wrinkled yellow grooved seed

a. llWwyyrr
b. LlWWyyRr
c. LlWwYYRr
*d. llWwYYrr

A
3
P .57
Cor.I.15
Cor.X.18

6. Most of our domestic breeds of animals have resulted from

a. natural selection
*b. selective breeding
c. mutations
d. environmental changes

A
3
P .36
Cor.I.12
Cor.X.33

7. In animals which reproduce sexually?

*a. the egg and sperm cells contribute equally to the heredity of the offspring
b. heredity alone determines what an organism will become
c. the offspring are in every way identical to the parents
d. acquired traits are transmitted to the offspring through egg and sperm cells

A
8
P .61
Cor.I.27
Cor.X.35

8. Gregor Mendel in his work

a. studied primarily the offspring obtained from a single mating
*b. used mathematics in the analysis of his findings
c. observed genes and chromosomes
d. figured out the location of genes upon the chromosomes

A
3
P .82
Cor.I.50
Cor.X.36

9. We refer to the genetic characteristics which can be recognized just by looking at an organism as the

a. genotype
b. Mendelian characteristics
c. homozygous characteristics
*d. phenotype

A
8
P .76
Cor.I.50
Cor.X.36

10. Each parent contributes one of the two genes for a particular characteristic. Whether or not the genes are exactly alike, they are called

a. heterozygous
b. homologous
*c. alleles
d. gametes

A
8
P .61
Cor.I.41
Cor.X.09

11. When a cross is made between two plants of tested pure lines, the parent generation is called the

a. F generation
*b. P1 generation
c. F2 generation
d. P2 generation

A
3
P .68
Cor.I.51
Cor.X.41

12. If a homozygous dominant tall plant is crossed with a homozygous short plant the offspring will be

*a. all tall
b. 50 per cent tall, 50 per cent short
c. all short
d. none of these

A
3
P .56
Cor.I.33
Cor.X.16

13. A test cross using recessive homozygous and heterozygous parents will result in

a. 3:1 ratio
*b. 1:1 ratio
c. 1:2:1 ratio
d. all recessive

A
3
P .47
Cor.I.48
Cor.X.34

14. Which law of Mendel is given as follows: A pair of factors is separated during the formation of gametes in reduction division

a. law of Unit Character
b. law of Dominance
*c. law of Segregation
d. law of Heredity

A
3
P .78
Cor.I.50
Cor.X.29

15. The actual gene combination resulting from a cross is the

*a. genotype
b. phenotype
c. allelotype
d. dihybrid

A
8
P .56
Cor.I.14
Cor.X.17

16. A mouse is often used in the studies of genetics because it

*a. has a rapid rate of reproduction
b. is clean and easily tamed
c. has only a few chromosomes
d. all of these

A
3
P .69
Cor.I.21
Cor.X.34

17. In Mendel's experiment with flowers, he found that in a cross of white flowered and a red flowered plant the resulting F1 generation were neither red nor white but pink flowered. Upon self-fertilization of these flowers the F2 generation would be

a. 1 white, 1 red
*b. 1 white, 2 pink, 1 red
c. all pink
d. 3 red, 1 white

A
8
P .81
Cor.I.27
Cor.X.57

18. What is a Greek word meaning "belonging to one another"?

a. heterozygote
b. homozygote
*c. allele
d. gametes
e. traits

A
3
P .36

Cor.I.27
Cor.X.25

19. The degree to which a hereditary trait is expressed depends on

*a. environment
b. genes only
c. chromosomes only
d. neither
e. both

A
3
P .82

Cor.I.28
Cor.X.38

20. The height of the offspring produced when purebred tall pea plants are crossed with purebread short pea plants illustrates

*a. dominance
b. independent assortment
c. chance
d. blending

A
3
P .60

Cor.I.38
Cor.X.19

21. The crossing of heterozygous organisms results in the appearance of dihybrid traits in the ratio of

a. 1:2:1
b. 3:1
*c. 9:3:3:1
d. 1:1

A
3
P .33

Cor.I.22
Cor.X.20

22. Mendel's law of Independent Assortment is best illustrated by crossing

a. monohybrids
b. a hybrid tall with a hybrid tall
*c. dihybrids
d. a red flowered with a white flowered plant

A
3
P .04

Cor.I.02
Cor.X.12

23. The ratio of 1:2:1 in the offspring of hybrids best illustrates the law of

a. dominance
b. independent assortment
c. linkage
*d. segregation

A
3
P .43

Cor.I.23
Cor.X.30

24. The best test cross is one in which the heterozygous organism to be tested is mated with an organism that is

a. known to be heterozygous for the trait in question
b. the parent with the homozygous dominant genotype for the trait in question
*c. known to have the homozygous recessive genotype for the trait in question
d. of the same genotype as the organism which is being tested

A
3
P .20
Cor.I-.15
Cor.X.05

25. The ratio 9:3:3:1 would indicate _____ of genes involved

a. 5
b. 4
c. 3
*d. 2
e. 1

A
3
P .95
Cor.I.22
Cor.X.12

26. Identical twins provide good study organisms in genetics because

*a. they are genetically identical
b. they have the same parents
c. they are of the same sex
d. they are the same age

A
3
P .65
Cor.I.04
Cor.X.29

27. Selective breeding has produced many desirable organisms over the last 3,000 years. The basis for selective breeding is

a. a knowledge of chromosomes
*b. recognition of desirable traits
c. feeding the proper food
d. an understanding of how genes work

A
3
P .82
Cor.I.23
Cor.X.11

28. In skin color in humans we find every shade between dark and light. We could assume from this that

a. one gene is completely dominant over the other
b. all white people have more dominant genes than black people
*c. there is more than one pair of genes for skin color
d. the population contains large numbers of hidden black genes

A
3
P .57
Cor.I.16
Cor.X.31

29. Differences between parents and offspring are termed

a. genetics
*b. variation
c. heredity
d. selection

A
3
P .84
Cor.I.34
Cor.X.20

30. The trait that will show up in a heterozygous condition would be the

*a. dominant trait
b. recessive trait
c. homozygous trait
d. double recessive trait

A
8
P .68

Cor.I.29
Cor.X.24

31. Why were Mendel's crosses with garden peas successful, where others had failed?

a. his success can mainly be attributed to luck... the right man at the right time at the right place
b. in his crosses, he only counted the offspring with the characteristics he hoped to get
c. he had a good knowledge of chromosomes and genes
*d. he applied the mathematics of probability to analyze his data

A
8
P .46

Cor.I .38
Cor.X.37

32. Which statement best explains why Mendel used garden peas for his crosses?

*a. garden peas are normally self-pollinated
b. there are usually multiple factors for a trait
c. there are only a few features to be studied genetically
d. crosses between different plants are usually not fertile

A
3

M 25.59
Cor.I .02
Cor.X.13

33. A family that already had four boys was awaiting the arrival of a new baby. The chances that the new baby would be a girl is statistically

*a. 1:1
b. 4:1
c. 9:1
d. 16:1

CHAPTER XXX

B
3
P .62
Cor.I.14
Cor.X.12

1. The parents of a newborn had the homozygous genotypes IAIA and IBIB. The child the mother is certain is hers has her blood type ii(O). Which of the following is not true?

   a. these people may only have children with genotype AB
   b. apparently the babies were mishandled in the hospital
   *c. it is possible for these parents to have an offspring with genotype ii(O)
   d. the mother has probably just made an error thinking this baby is hers

B
3
P .75
Cor.I.24
Cor.X.38

2. Two brown-eyed persons had five children three of which had brown eyes, one hazel, and one blue. According to this frequency what gene is dominant and what are the parental genotypes?

   a. genotypes BB,Bb, brown is dominant
   b. genotypes Bb,Bb, blue is dominant
   c. genotypes BB,BB, brown is dominant
   *d. genotypes Bb,Bb,brown is dominant

B
3
P .73
Cor.I.46
Cor.X.35

3. John williams has tufts of hair in his ears. He has four children and the two boys also have these "hairy ears". John's maternal grandfather before him had this same characteristic. Which of the following hypothesis explains why John and only some of his offspring have this trait?

   *a. hairy ears is apparently a six-linked characteristic
   b. the female offspring will develop this characteristic much later in life
   c. the females developed an immunity to this problem
   d. mutations occurred in the cells which formed the females and this gene was apparently lost

B
3
P .68
Cor.I.32
Cor.X.24

4. We have two guinea pigs to cross. The male has genotype BbCc (B-black, b-brown, C-curly coat, c-smooth coat). The female has genotype bbcc. What are the phenotypes of the offspring?

   a. $\frac{1}{2}$ black and curly, $\frac{1}{2}$ black and smooth
   *b. $\frac{1}{4}$ black and curly, $\frac{1}{4}$ black and smooth, $\frac{1}{4}$ brown and curly, $\frac{1}{4}$ brown and smooth
   c. 1/8 black and curly, 1/8 brown and smooth, $\frac{1}{2}$ brown and curly, $\frac{1}{4}$ black and smooth
   d. $\frac{1}{4}$ black and curly, $\frac{1}{4}$ black and smooth, $\frac{1}{2}$ brown and curly

B
3
P .76
Cor.I.08
Cor.X.02

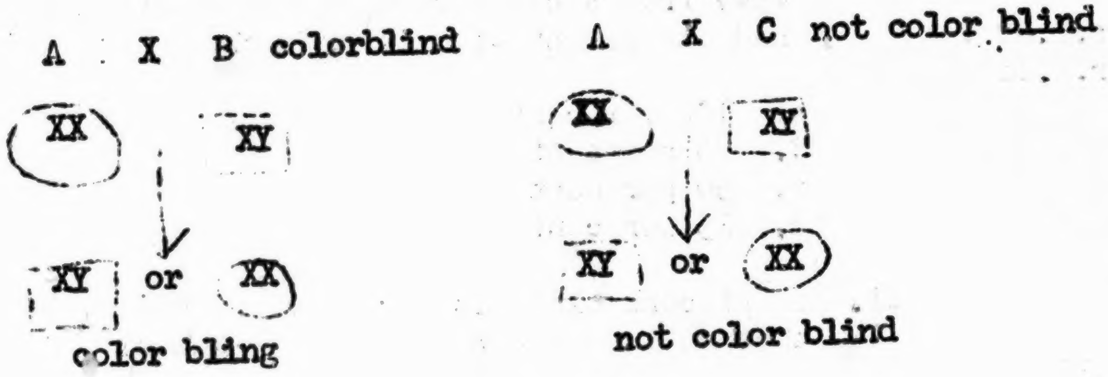
5. The significance of Mendel's use of many similar pairs in his genetics study, but studying one trait was that

   a. he was kept busy for a long time
   b. he was able to observe results under variable conditions
   c. he could use surplus seeds to supplement the monk's diet
   *d. he was able to study the appearance and disappearance of a trait, generation after generation

B
3
P .25

Cor.I-.10
Cor.X-.34

6. What is the significance of the fact that color blindness is a sex-linked characteristic, to the following pedigree, with regard to the genotype of parent A



a. parent A is homozygous colorblind
b. parent A is not a carrier
*c. parent A is heterozygous colorblind
d. none of the above are correct

B
3
P .31

Cor.I.61
Cor.X.57

7. If three quarters of the offspring of many experimental crosses showed the dominant character, the parents were

a. both pure dominant
*b. both hybrid
c. one pure dominant, one recessive
d. one hybrid, one pure dominant

B
3
P .16

Cor.I-.01
Cor.X-.04

8. In a problem in genetics dealing with a trihybrid cross (for example AaBbCc), the algebraic solution is derived by performing the A cross, B cross, and C cross separately and then combining the results of the three crosses by algebraid multiplications would be used to determine the probable frequency of offspring which were homozygous dominant for all three traits in question?

*a. $\frac{1}{4}$ AA x $\frac{1}{4}$ BB x $\frac{1}{4}$ CC
b. $\frac{1}{2}$ Aa x $\frac{1}{2}$ Bb x $\frac{1}{2}$ Cc
c. $\frac{1}{4}$ aa x $\frac{1}{4}$ bb x $\frac{1}{4}$ cc
d. a, b, and c above
e. none of the above

B
8
P .47

Cor.I.26
Cor.X.09

9. Which of the following types of gametes would you expect an animal with genotype RrTt to produce if there is no linkage between R and T?

a. Rr, Tt, RT, rt
*b. RT, Rt, rT, rt
c. Rt, rt
d. Rt, rT
e. R, r, T, t

B
3
P .74

Cor.I.40
Cor.X.26

10. We find that in horses there is a trait for wavy coat and that it is recessive. Assuming that this is controlled by a single gene, what percentage of the offspring would be wavy from a cross between two smooth haired horses who each had one parent with wavy hair?

a. 100 per cent
b. 75 per cent
c. 50 per cent
*d. 25 per cent

B
3
P .21

Cor.I.00
Cor.X.15

11. In pigeons black is recessive to white, how could we be sure that we have a pure strain of whites?

*a. cross each individual to a black
b. cross each individual to white
c. select only white birds for breeding
d. discard all black offspring

B
3
P .32

Cor.I.07
Cor.X-.05

12. The appearance of traits showing differences between parent and offspring may be visible as a phenotype and at the same time a visible expression of the genotype if

a. the genotype is a result of a dominant allele
b. at fertilization there is a random uniting of gametes
*c. the traits are a result of a homozygous condition of alleles
d. the traits are a result of a heterozygous condition of alleles

B
3
P .57

Cor.I.36
Cor.X.24

13. If homozygous round peas were crossed with homozygous wrinkled peas and the outcome of this cross was other than the one expected, what could be the possible reason?

a. the alleles of the parent round peas were different
b. the alleles of the parent wrinkled peas were different
*c. crossing over took place amoung the chromosomes of the gametes
d. crossing over took place among the F_1 gametes

B
3
P .16

Cor.I-.02
Cor.X-.04

14. There was a mixup of two male babies in the hospital. Baby 1 had type O blood and baby 2 type AB blood. The parents X had type A and type O blood. The parents Y had type A blood and type B blood. The parents of baby 1 were

*a. parents X
b. parents Y
c. neither
d. either could have been according to these blood types

B
3
P .43
Cor.I.32
Cor.X.21

15. Hornless is dominant over horned in cattle. A farmer has a herd of short horned (hornless) cattle. He has fences that are too high for any of the neighbors cattle to mix with his, yet there appears a horned calf from time to time in his herd. The reason for this is

a. all are pure line hornless
*b. some are hybrid hornless
c. a mutation is taking place
d. hornless in cattle is sex-linked

B
3
P .66
Cor.I.53
Cor.X.39

16. Assume you have the following cross:
pure line tall (dominant) pink four o'clock X short white four o'clock
From the given information you could expect

*a. no short white offspring
b. no pink tall offspring
c. only pink short offspring
d. 25 per cent chance of short white offspring

B
3
P .72
Cor.I.39
Cor.X.14

17. A mother of blood type A and a father of blood type B discovered that their new-born child was of type O. It was then apparent that

a. the hospital gave them the wrong infant
*b. the parents were both heterozygous
c. the father is homozygous for B but the mother may be heterozygous
d. the mother is homozygous, for A but the father is heterozygous

B
3
P .65
Cor.I-.05
Cor.X.15

18. If the probability that a girl has red hair is 1/10, and the probability that a girl has blue eyes is 1/4, the chances that a girl has both red hair and blue eyes is

a. 1/14
b. 1/6
*c. 1/40
d. 2/5

B
3
P .38
Cor.I.23
Cor.X.26

19. A second generation cross shows a combination of 3 genotypes and 3 phenotypes. Which answer offers the best explanation for this result?

*a. incomplete dominance by crossing hybrids
b. incomplete dominance by crossing pure characteristics only
c. complete dominance by crossing hybrids
d. complete dominance by crossing pure characteristics only

B
3
P .07
Cor.I.32
Cor.X.26

20. Among your acquaintances, you have noticed an individual with two short thumbs, which have very broad nails. You have also observed that the parents of this individual each have one such thumb. From your observation and knowledge of genetics you may safely assume that

*a. no dominance of genes is shown
b. the gene for "short thumbs" is dominant
c. the gene for short thumbs is recessive
d. there appears to be a blending affect such as in the four-o'clock colors

B
3
P .51
Cor.I.06
Cor.X.05

21. A man with type Ab blood marries a woman with type O blood. They have a single child who, when mature, marries a person with type A blood. Their offspring may have a blood type of

a. A
b. O
c. Ab
d. B
*e. not enough information given

B
3
P .84
Cor.I.19
Cor.X.16

22. In relation to the number and kinds of chromosomes present (hence the genes present) in the gametes of a particular species of animal, which of the following is of the greatest significance in the development of a new individual organism of this particular species?

a. the egg contributes much food in its cytoplasm for the development of the early embryo
b. the sperm contributes primarily nuclear material, and a relatively small amount of cytoplasmic material
*c. each gamete involved in the formation of a new individual normally contributes one member of each pair of chromosomes to the new individual
d. the sperm cell and the egg cell may both carry identical forms of the genes on the chromosomes

B
3
P .72
Cor.I.29
Cor.X.16

23. What an organism will become depends on both its heredity and its environment. In human beings, identical twins who have identical hereditary complements but who are raised in different environments differ somewhat in intelligence, as best we can tell from using I.Q. tests as measuring instruments. Which of the following is a basic biological principle reflected or exemplified by the case of the twins described above?

a. heredity is more important than environment in the development of an individual
b. environment is more important in the development of an individual than its heredity
*c. environment controls the expression of certain genes
d. heredity controls the environment of an individual

B
3
P .09

Cor.I.12
Cor.X.05

24. If two offspring result from the cross Aa x Aa, what is the probability that both offspring will have the genotype aa?

*a. 1/16
b. 1/8
c. 1/4
d. 1/2
e. 1.32

B
3
P .47

Cor.I.38
Cor.X.37

25. If a cross were made between two black, rough-haired guinea pigs and the resultant offspring included in addition to six black, rough-haired guinea pigs, one white one, one could assume that

a. one of the parents carried genes for white
*b. both of the parents carried genes for white
c. a mutation had occurred
d. white is a dominant trait

B
3
P .37

Cor.I.28
Cor.X.31

26. A and B are traits that are known to be located on the same chromosome. In a union of parents who were AB and ab, the resultant offspring were three AB, two ab and one Ab. A probable explanation is

a. AB is dominant to ab
*b. crossover had occurred
c. AB and ab are allelic traits
d. this is a normal phenotypic ratio

B
3
P .31

Cor.I.34
Cor.X.31

27. In the following case of inheritance let "A" represent the dominant gene for tall, "a" the recessive gene for short, "B" the dominant gene for black and "b", the recessive gene white, "C" the dominant gene for curly and "c" the recessive gene for straight. In crossing the individuals with the following genotypes:

AaBbCc x AaBbCc

what proportion of the offspring can be expected to be homozygous for all three recessive traits that is, short, white and straight?

*a. 1/64
b. 1/32
c. 1/16
d. 1/4
e. 1/8

B
3
P .35

Cor.I.35
Cor.X.18

28. In doing field work, you discover a plant whose flower color is different from the flower color of all other members of this species of plant. You want to know if this plant is pure hybrid. The best way to determine this would be

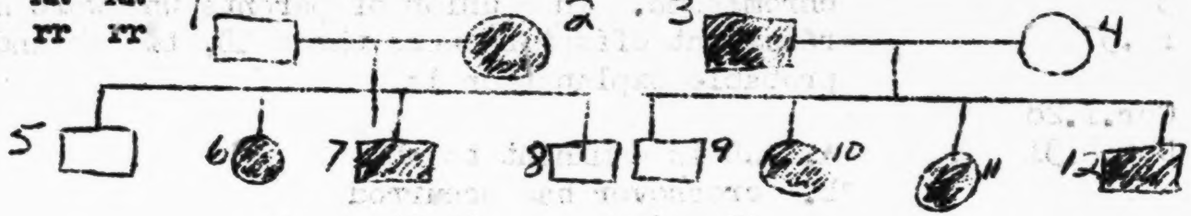
*a. cross it with a known pure recessive plant (same specie)
b. cross it with a known pure dominant plant (same specie)
c. cross it with a known hybrid plant (same specie)
d. none of the crosses listed in a through c would be of value in answering the question

B
3
P .55

Cor.I.15
Cor.X.31

29. Examine the following pedigree chart for handedness and answer the following questions. (Left handedness is shown by shaded symbols.) Right handedness is dominant (R), left handedness (r) is recessive. What are the genotypes of numbers 8 and 9?

a. Rr rr
b. RR rr
*c. Rr Rr
d. RR RR
e. rr rr



B
3
P .06

Cor.I-.04
Cor.X-.12

30. If parents number 3 and 4 had 20 children, how many would you expect to be like no. 9?

a. none
b. 5
*c. 10
d. 15
e. 20

B
9
P .50

Cor.I.29
Cor.X.19

31. If an egg produced by an organism has 20 chromosomes, the body cells of the animal developing from the egg will have how many chromosomes?

a. 10
b. 20
*c. 40
d. 80
e. variable number

B
3
P .47

Cor.I.38
Cor.X.22

32. The bridge of life from generation to generation is

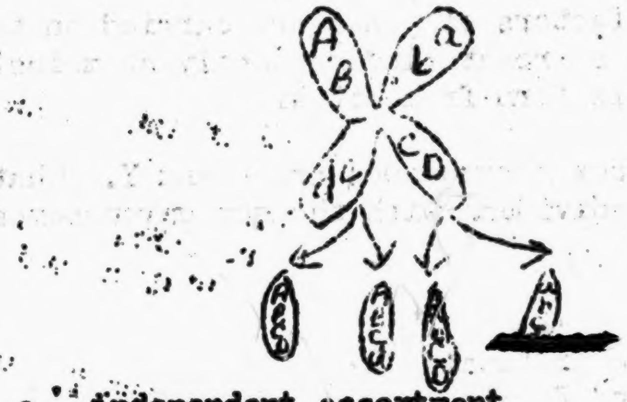
a. any animal that swims from an inhabited Pacific island to one that is not inhabited
b. the period of growth and development of an egg
c. the story of life
*d. the microscopic egg and sperm
e. none of these

CHAPTER XXXI

A
3
P .25

Cor.I.05
Cor.X-.12

1. What process is illustrated in the following diagram?



a. independent assortment
b. sex linkage
*c. crossing over
d. natural selection

A
3
P .87

Cor.I.43
Cor.X.38

2. Human ova and sperm are similar in that

*a. they have the same number of chromosomes in their nuclei
b. they have the same relative amount of cytoplasm surrounding their nuclei
c. their locomotion is achieved with equal facility
d. about the same number of each is produced

A
3
P .28

Cor.I-.15
Cor.X-.13

3. Whether or not the offspring will be male or female in various species is determined by

a. sex chromosomes
b. sex-determining sperms
c. sex-determining eggs
*d. all of the above
e. none of the above

A
3
P .55

Cor.I.37
Cor.X.29

4. A trait which is sex-linked in humans is

a. eye color
*b. hemophilia
c. height
d. bald headness

A
3
P .27

Cor.I.19
Cor.X-.06

5. Pairing of homologous chromosomes best describes

a. synaps
b. segregation
c. replication
*d. synapsis
e. linkage

CHAPTER XXXI

6. According to the chromosome theory of inheritance

.63 a. chromosomes are made up of DNA
*b. hereditary factors of genes are carried on the chromosomes
or.I.27 c. chromosomes segregate independently at meiosis
or.X.17 d. two new cells form from mitosis

7. In humans, the sex chromosomes are X and Y. What would be the sex of an individual with the sex chromosomes XXY?

.42
*a. male
or.I.06 b. female
or.X.01 c. neither male or female
d. both male and female

A
3
8. In all conditions where the defective gene is in the X chromosome, transmission to a male can be

P .32
*a. only through his mother
Cor.I.17 b. only through his father
Cor.X.02 c. either through the mother or father
d. by spontaneous mutation only

A
3
9. A small number of genes (defective genes) in the X chromosome are of the dominant type. In these conditions an afflicted father will transmit the genes and resulting condition to

P .28
Cor.I.28 *a. all his daughters
Cor.X.11 b. only half his daughters
c. all the sons
d. none of the offspring

A
3
10. In humans, what is the number of chromosomes in a normal sperm cell?

P .43
a. 23 pair, including XX
Cor.I.15 b. 23 pair, including XY
Cor.X.13 *c. 23 chromosomes, including either X or Y
d. 23 chromosomes, with neither X nor Y

A
8
11. If characteristics are linked (not sex-linked) they

P .47 a. are carried on homologous chromosomes
*b. are carried on the same chromosome
Cor.I.03 c. form in groups equal to the diploid number of chromosomes for species
Cor.X.18
d. do not have an allele in males

A
3
12. Crossing over in chromosomes results in new

P .31 *a. linkage groups
b. genes
Cor.I.14 c. multiple alleles
Cor.X.05 d. traits
e. species

A
3
P .27
Cor.I.27
Cor.X-.09

13. Sex determinants differ in man as compared to Drosophila because

*a. a singly Y chromosome always produces a male in man
b. a single X chromosome always produces a male in man
c. the number of X chromosomes is irrelevent in determining the sex of Dropophila
d. none of the above

A
3
P .52
Cor.I.48
Cor.X.49

14. What is the significance of the relationship between meiosis and the number of chromosomes of plants and animals?

a. the monoploid number of chromosomes is reduced to the diploid no.
*b. the diploid number of chromosomes is reduced to the monoploid no.
c. the monoploid and diploid number of chromosomes are both reduced
d. the diploid and monoploid number of chromosomes are both increased

A
3
P .37
Cor.I-.12
Cor.X-.17

15. A fruit fly with an X chromosome, but no Y chromosome is

a. female, but always sterile
*b. a male, but always sterile
c. neither female nor male
d. a male at first and later changes to female

A
3
P .35
Cor.I.31
Cor.X.09

16. A human female with XXX chromosomes is

a. sterile
b. able to lead a short life only
*c. normal and fertile female
d. none of the above

A
3
P .72
Cor.I.54
Cor.X.21

17. If a human being inherits two X chromosomes, it is likely that this individual will be

*a. female
b. male
c. color bline
d. none of the above

A
3
P .74
Cor.I.29
Cor.X.09

18. What was the significance of research with nondisjunction in fruit flies to the field of genetics?

a. no relation to human genetics
b. helped provide proof for chromosome theory of heredity
c. techniques developed which later were used to prove occurance of nondisjunction in humans
*d. both c and b

A 19. Inability to distinguish red from green is
3
P .38 a. heredity-linked
*b. sex-linked
Cor.I.50 c. hormone-linked
Cor.X.14 d. color-linked

A 20. Heredity is controlled by
8
P .64 a. zygotes
b. ovules
Cor.I.10 *c. genes
Cor.X-.05 b. anthers

A 21. If the zygote cell in man contains 46 chromosomes, the monoploid contains
3
P .71
a. 92
Cor.I.37 b. 46
Cor.X.51 *c. 23
d. 11 ½

A 22. Which of the following statements has proved to be scientifically acceptable?
3
P .75
a. the superior mental, moral, and physical traits of the
Cor.I.31 bluebloods are transmitted via the blood stream
Cor.X.58 b. by royal blood is meant that members of royal families generally carry superior traits which are passed on in the blood, generation after generation
c. certain criminals have inherited tainted blood and are likely to pass it on
*d. the vehicle of heredity operates independently of the blood

CHAPTER XXXI

B
3
P .35
Cor.I.14
Cor.X.31

1. Experiments with sex determination in Drosophila have shown that in normal sex inheritance, males are XY and females are XX. However, in certain cases of exceptional inheritance, due to non-disjunction of chromosomes during meiosis, it was found that XXY is also a female. Therefore, what really determines the sex of the individual?

a. the number of Y chromosomes (or none), regardless of the number of X
*b. the number of X chromosomes, regardless of number of Y
c. the combination of effects of the X and Y chromosomes
d. the inheritance of sex in previous generation

B
3
P .10
Cor.I.17
Cor.X.07

2. In *Drosophila* eye color is a sex-linked characteristic with red eye color dominant over white eye color. Which of the following groups of progeny would you expect from a cross between a white-eyed female and a red-eyed male?

*a. all red eyed
b. all white eyed
c. all females white eyed and all males red eyed
*d. all females red eyed and all males white eyed
e. half the females red eyed, half the males red eyed

B
3
P .25
Cor.I-.11
Cor.X.11

3. A normal woman with the gene for hemophilia married a man who was a hemophiliac (one of the few who survived). We can expect that

a. all the children will have hemophilia
b. all the sons will have hemophilia, but none of the daughters
*c. some of the boys may be normal
d. none of the above

B
3
P .61
Cor.I.15
Cor.X.06

4. Relate your knowledge of the X and Y chromosomes to a plan a farmer has developed. If the farmer sells male calves only for the first five years while building a breeding herd, then

a. 75 per cent of the offspring will be sellable
b. his herd size will double each year
*c. 50 per cent of the offspring, discounting the death loss, will be sellable each year
d. he will need government subsidy

B
3
P .93
Cor.I.22
Cor.X.39

5. Two strains of yeast cells, A and B were sent on a five year space trip. Upon being returned to earth, it was found that neither of the original strains were alive, but a new strain C was aboard. You may conclude that

a. someone exchanged them in space
b. the ship was contaminated before leaving
c. the original strains were mis-identified
d. the returned strain is mis-identified
*e. mutations have occurred

B
3
P .65
Cor.I.15
Cor.X.25

6. If a color blind man marries a normal woman whose father was color blind, the theoretical expectation would be that

*a. 50 per cent of the sons would have normal vision
b. all of the children would be color blind
c. all of the daughters would be color blind
d. none of the daughters would transmit the trait

B
3
P .47
Cor.I.61
Cor.X.51

7. When a color-blind man marries a homozygous normal vision woman, the chances of their having color-blind children are

a. 2 to 1
b. even
c. less than even
*d. zero

B
9
P .63
Cor.I.40
Cor.X.05

8. Why do farmers generally buy new hybrid seed corn instead of using the seed from the previous crop for spring planting?

a. the farmers hope that the new seed will be improved
*b. some of the recessive factors may show up and reduce the vigor of the plant
c. it is cheaper to buy new seed than to shell the ear corn and get it ready for planting
d. the first hybrid generation always produces better plants than the second

B
3
P .38
Cor.I.34
Cor.X.11

9. In all conditions where the defective gene is in the X chormosome, transmission to a female can be

a. only through the mother
b. only through the father
*c. through the mother or the father
d. this condition never occurs

CHAPTER XXXI

D 1. What is the significance of the two successive divisions of
1 the chromosomes during meiosis, for the production of double
P .51 cross hybrids?

Cor.I.23 a. to develop independent assortment according to chance
Cor.X.13 b. to be able to form diploid cells in the gamete
c. to always develop shielding traits
*d. to develop variety by segregation and recombining parts of chromatids during synapsis

CHAPTER XXXII

A
8
P .60
Cor.I.35
Cor.X.21

1. What were the results when extract from capsulated pneumococcus was added to type II pneumococcus cells?

a. type II cells all died
*b. some of the type II cells formed capsules
c. type II cells showed no apparent change
d. cells only grow in places where the extract didn't touch

A
8
P .45
Cor.I.36
Cor.X.04

2. What is the main difference between ribose and deoxyribose compounds in the nucleic acid molecule?

a. there is one less hydrogen in ribose
b. ribose has 3 carbons
c. deoxyribose has 3 carbons
*d. deoxyribose has one less oxygen
e. ribose has one nitrogen

A
8
P .65
Cor.I.29
Cor.X.42

3. The nitrogen bases making up the steps of the DNA molecule are

a. adenine and thymine
b. purines
c. guanine and cytocine
d. pyrimidines
*e. all of the above

A
8
P .57
Cor.I.12
Cor.X-.03

4. The role of the RNA, which has been made by DNA is to

a. build proteins in the cytoplasm
b. act as a messenger
c. become a template on the surface of ribosomes
*d. perform all of the above

A
8
P .40
Cor.I.38
Cor.X.32

5. The substance which carries information from the DNA to the ribosomes is

a. messenger DNA
*b. messenger RNA
c. transfer DNA
d. transfer RNA
e. polypeptide chain

A
8
P .09
Cor.I.15
Cor.X.21

6. An example of a pyrimidine molecule would be

a. adenine
b. deoxyribose
c. guanine
d. ribose
*e. uracil

A
3
P .56
Cor.I.37
Cor.X.19

7. The significance of the experiment with the transplanting of the Acetabularia is that

a. the cap regenerates from the stalk and not from the bases
b. the cap has the characteristic of the stalk
*c. the nucleus exerts a strong influence on the development of the cap, such that the cap has characteristics of the species supplying the nucleus
d. regeneration of tissue occurs even after grafting
e. none of the above

A
8
P .76
Cor.I.32
Cor.X.19

8. Watson and Crick proposed a model of which molecule?

a. RNA..
*b. DNA
c. ATP
d. adenine nucleotide
e. pyrimidine

A
8
P .34
Cor.I.33
Cor.X.27

9. The DNA molecule is in the form of a

a. circle
*b. double helix
c. hexagonal figure
d. triple ellipse
e. rectangle

A
8
P .74
Cor.I.38
Cor.X.28

10. The pneumococcus bacteria cannot be engulfed by white blood cells because

*a. they have a protective capsule
b. they are too fast for the white blood cells
c. they do not get into the blood
d. they have anti-DNA

A
8
P .69
Cor.I.30
Cor.X,10

11. Which of the following enters a bacteria from an infecting virus?

a. intercallary hooks
*b. DNA
c. protein coat
d. nucleus

A
8
P .65
Cor.I.35
Cor.X.19

12. DNA can always be found in

*a. chromosomes
b. cytoplasm
c. ribosomes
d. none of the above

A
6
P .45

13. The "messenger" which carries instructions of the genes to the ribosomes for the synthesis of proteins in the cytoplasm is

Cor.I.35
Cor.X.11

a. DNA
*b. RNA
c. cytosine
d. none of the above

A
8
P .73

14. Of the following, the process which does not usually produce mutations is

*a. mitosis
b. chromosome cross over
c. atomic radiations
d. X Rays

Cor.I.56
Cor.X.38

A
8
P .94

15. The unit determiner of a hereditary trait is

a. gemmule
b. gonad
c. ganglion
d. glomerulus
*e. gene

Cor.I.31
Cor.X.40

A
3
P .17

16. Which of the following statements about crossing over is most correct?

Cor.I.31
Cor.X.09

a. there are as many crossing over possibilities as there are genes in a given cell
*b. the farther apart two genes lie on the chromosome the greater the likelihood of their crossing over
c. all genes are capable of producing detectible changes in the organism as a result of crossing over
d. genes that are linearly adjacent on a chromosome have the greatest cross-over potential
e. none of the above

A
8
P .64

17. Both RNA and DNA are made up of

Cor.I.22
Cor.X.07

a. carbohydrates
b. fats
*c. nucleotides
d. ribosomes

A
8
P .18

18. Which of the following working proposed a working model of a DNA molecule?

Cor.I.43
Cor.X.21

*a. Watson and Crick
b. Avery, McLeod and McCarty
c. Beadle and Tatum
d. Bridges

A
8
P .29
Cor.I.22
Cor.X.26

19. A type of pyrimidine found in DNA is

a. ribose
*b. cytosine
c. adenine
d. guanine

A
8
P .71
Cor.I.46
Cor.X.28

20. Experiments have shown that live pneumococcus bacteria without capsules can be induced to form capsules in the presence of an extract which has been prepared from dead pneumonococci with capsules. Thus it has been shown that living pneumococcus cells could be transformed, in the presence of some substance from the capsule-forming cells (note the *live* capsule-forming cells are *not* present.)

This transforming principle has to be shown to be

a. ATP
b. ADP
*c. DNA
d. TPN

A
8
P .51
Cor.I.51
Cor.X.21

21. The difference between the harmful and harmless strain of Pneumococcus are all of the following except one

a. one type is surrounded by a capsule
b. the presence or absence of capsules is inherited
c. the strain without a capsule can be destroyed by white blood cells
*d. the strain with a capsule is subject to destruction by red blood cells

A
8
P .40
Cor.I.42
Cor.X.32

22. Griffith's experiments with mice proved all of the following except

a. mice will live with pneumococcus that does not develop a capsule
b. cells previously unable to form capsules had been transformed into cells that could form capsules
c. once a cell has been transformed, the new ability in inherited
*d. eventually all pneumococcus cells would develop a capsule regardless of circumstances

A
8
P .20
Cor.I-.16
Cor.X-.10

23. How genes actually function on the cellular level comes from the following investigations

a. work with drosophila
b. work with neurospora
c. work with red blood cells
*d. work with hemoglobin

A
8
P .26

Cor.I.33
Cor.X.06

24. DNA and RNA are alike except that

a. DNA alone carries the genetic "Picture"
b. DNA has the ability of replication while RNA does not
*c. DNA has one less O_2 atom and thymine in place of uracil
d. the RNA "ladder" has three legs
e. none of the above

A
8
P .21

Cor.I-.18
Cor.X-.18

25. The putting together of nucleotides is accomplished by the process of

a. hydration
b. oxidation synthesis
*c. dehydration synthesis
d. oxygen reduction

A
8
P .43

Cor.I.31
Cor.X.11

26. Mendel's work with garden peas established the existance of hereditary determiners or factors

Avery, McLeod and McCarty demonstrated that the transforming principle in pneumococci bacterial cells was DNA

With regard to both and only those two lines of investigation, it would be reasonable to conclude which of the following?

*a. the hereditary factors are genes, genes are DNA
b. the hereditary factors are chromosomes and the transforming principle is DNA
c. that hereditary factors are not present in pneumococci cells
d. DNA is a complex organic molecule

CHAPTER XXXII

B 1. RNA and DNA are similar in all ways, except for one of the following
2
P .55

a. made of nucleotides
Cor.I.27 b. have 2 purines and 2 pyrimidines
Cor.X.37 c. have the ability to replicate
*d. have the same number of oxygen, and hydrogen atoms in the 5-carbon sugar

B 2. If a mutation occurs in a segment of a DNA molecule, it is reasonable to conclude that
3
P .37

a. a necessary enzyme may not be synthesized
Cor.I.29 b. the synthesized proteins would also be changed
Cor.X.13 c. the complementary RNA would also be altered
d. only b and c are correct
*e. a, b, and c are correct

B 3. Which of the following would be of least importance in selecting
9 Neurospora, as an experimental organism for studies in genetics
P .45 and inheritance?

Cor.I.12 a. it grows extremely well on a minimal medium in a test tube
Cor.X-.24 b. it is easy to obtain and about the only materials absolutely essentail for its growth is a medium containing salts, sugar, and a vitamin, biotin
c. it is quite complex biochemically
*d. it is a pink bread mold of rather simple structure

B 4. A nucleotide is formed by the bonding together of one molecule
8 each of adenine, deoxyribose, and phosphoric acid. This is
P .52 one of the four kinds of nucleotides or building blocks of DNA. These four nucleotides differ from one another only

Cor.I.18
Cor.X.11 *a. in the kind of purine or pyrimidine they contain
b. in the basic atomic structure of each
c. in name
d. for reasons of identification
e. to inform chemists

B 5. We might expect to find large numbers of ribosomes in cells
6 in which
P .31

*a. large amounts of proteins are synthesized
Cor.I.44 b. much energy is consumed
Cor.X.39 c. rapid division is occuring
d. there is a shortage of DNA

B
3
P .32

6. A mutant bacteria requires no added amino acids in its culture medium although the parent strain needs several for survival. This suggests that those acids

Cor.I.24
Cor.X.31

a. play no part in the mutants metabolism
*b. are manufactured by the mutant organism
c. underwent mutation
d. are controlled by a gene

C 1. What conclusions can you make from the experiment of Avery,
3 MacLeod, and McCarty?
P.55

a. we could conclude that the gene is DNA
Cor.I.24 b. genes can be extracted from one organism and made to
Cor.X.11 enter another
c. DNA can change the heredity of the cells so thay they
will form capsules
*d. all of the above are correct

CHAPTER XXXII

D
8
P .60

Cor.I.30
Cor.X.24

1. An important finding concerning the nucleotides is that

a. the amount of adenine present is the same amount as thymine
b. the amount of guanine and cytosine are the same
c. the bond between molecule strands is weak
d. during the replication process, exact duplication occurs
*e. all of these

CHAPTER XXXIII

A 1. The blood type of a person where there is an absence of
3 alleles IA and IB, would be
P .76

a. AB
Cor.I.35 *b. O
Cor.X.26 c. B
d. A
e. BO

A 2. Sickle cell anemia results from
8
P .12 a. a decrease in oxygen concentration in the plasma
b. the inability of red blood cells to transport carbon dioxide
Cor.I.22 c. the distortion of red blood cells
Cor.X.01 *d. the replacement of glutamic acid with valine in the hemoglobin molecule
e. the replacement of the adenine with amino acid of the hemoglobin molecule

A 3. The generation in which a cross is made between two plants
8 of tested pure varieties is the
P .22

a. F1 generation
Cor.I.00 *b. P generation
Cor.X.07 c. F2 generation
d. P 2 generation

A 4. The word filial refers to
8
P .72 a. parents
b. flowers
Cor.I.08 *c. offspring
Cor.X-.04 d. seed color

A 5. If AA plants were crossed with aa plants, what would the
8 results of the cross be?
P .58

a. all offspring would be homozygotes
Cor.I.33 *b. all offspring would be heterozygotes
Cor.X.28 c. $\frac{1}{2}$ of the offsprings would be homozygotes
d. $\frac{1}{2}$ the offsprings would be heterozygotes
e. none of the above

A 6. Why does color blindness occur more in males than females?
3
P .31 a. the Y chromosome is where it is carried
b. it is carried as a dominant in males and a recessive gene
Cor.I-.02 in females
Cor.X.15 *c. the male needs only one recessive gene
d. the genes for cones are associated with those for long hair in females

A
8
P .92
Cor.I-.02
Cor.X-.09

7. When a coin is flipped it has a 50 per cent chance of falling heads or tails. If it is flipped once and falls heads, on the next flip it has what chance of falling tails?

a. 100 per cent
*b. 50 per cent
c. 25 per cent
d. 0 per cent
e. none of these

A
3
P .25
Cor.I.19
Cor.X.12

8. Which of the following genetic factors make it exceedingly difficult to eliminate feeblemindedness from the population?

a. since all feebleminded individuals are heterozygous, it is unpredictable what genes they will transmit to their offspring
*b. feeblemindedness is a recessive trait
c. feebleminded people always raise large families
d. feeblemindedness is caused by gene mutation
e. feeblemindedness is a dominant trait

A
8
P .75
Cor.I.35
Cor.X.30

9. A sex-linked characteristic is

*a. color-blindness
b. cancer
c. diabetes
d. anemia

A
8
P .70
Cor.I.25
Cor.X.14

10. The structure in the cell that are the determiners of heredity are called

a. alleles
b. chromosomes
*c. genes
d. centromeres

A
8
P .49
Cor.I.29
Cor.X.12

11. In the equation $p^2 + 2pq + q^2 = 1$, the 1 refers to

a. a random sample of the population
*b. all the population under study
c. all those in the population of the same genotype
d. all those in the population of the same phenotype

A
3
P .55
Cor.I.34
Cor.X.30

12. Non-tasters are

a. of differing genotypes
b. of heterozygous condition
c. of differing phenotypes
*d. of homozygous condition

A
3
P .52

Cor.I.49
Cor.X.39

13. Considering tasters, the genotypes TT, Tt, and tt, how many different phenotypes are there?

a. one
*b. two
c. three
d. six

A
3
P .93

Cor.I.11
Cor.X.21

14. In calculating the frequency of genes in a population the following equation is used: $p + q = 1.00$. If you know the frequency of p is 0.45, then q should be

*a. 0.55
b. 0.45
c. 1.45
d. 0.00

A
8
P .75

Cor.I.30
Cor.X.19

15. Man has been able to get the traits he desires in various organisms for example, sheep with heavy coats of wool, cows that produce more milk, wheat that has more grain in the head or spike, and hybrid corn. The way in which he has brought this about is

a. selection by the natural environment
*b. artificial selection
c. random mating of organisms
d. natural selection

A
8
P .88

Cor.I.09
Cor.X.24

16. A person with O type blood is sometimes referred to as a universal donor. This is due to

a. B can receive O type blood
b. A can receive O type blood
c. A and B can receive O type blood
d. O can also receive O type blood
*e. all of the above are correct

A
8
P .45

Cor.I.15
Cor.X.02

17. If a certain trait, bb, occurs in 16 per cent of a population, what is the frequency of homozygous BB in the population?

a. 48 per cent
b. 64 per cent
*c. 36 per cent
d. 75 per cent

A
8
P .75

Cor.I.44
Cor.X.47

18. The mathematical relationship concerning frequencies of different kinds of zygotes which remain the same generation after generation is known as the

a. Watson-Crick model
b. Bridges' Hypothesis
c. Morgan Theory
*d. Hardy-Weinberg Principle

A
3
P .39

19. One problem in using small populations in genetic studies is one of

Cor.I.16
Cor.X.09

*a. random sampling
b. sampling errors
c. sampling time
d. no control
e. none of these relating bodies of knowledge

B
3
P .61
Cor.I.33
Cor.X.22

1. It is observed in a group of plants, that one is a mutant plant. This is cross-bred to obtain a new variety. This is an example of

   a. artificial selection, involving an induced mutation
   *b. artificial selection, involving a chance mutation
   c. a natural selection, involving an induced mutation
   d. a natural selection, involving a chance mutation

B
3
P .33
Cor.I.11
Cor.X.19

2. A person with AB type blood

   a. can receive O type blood
   b. can receive A type blood
   c. can receive B type blood
   d. only b and c are correct
   *e. a, b, and c are correct

B
9
P .70
Cor.I.19
Cor.X.14

3. Our entire school population was given the standard IQ test. 65 per cent scored above average in intelligence. From this data, you conclude that

   a. 65 per cent of the students of all other schools are above average in intelligence
   b. the tests were too easy
   c. percentages are different in another school
   *d. the sample tested was too small to come to any valid conclusion for all California schools
   e. this is normal for all schools

B
9
P .63
Cor.I.24
Cor.X.15

4. If, after much study and thorough investigation of a vast population over a period of years, no organisms of a particular species could be found with a certain homozygous recessive genes, you might be able to say that

   a. these crosses had not occured
   b. the study was to casual - there is no other explanation
   *c. the homozygous condition may be lethal
   d. none of the above could be considered

B
3
P .75
Cor.I.47
Cor.X.18

5. What will likely happen to a mutant allele if the possessor has a slight advantage because of it?

   a. since it is a mutation it will soon be dropped from the gene pool
   *b. the offspring will have an advantage over others and the gene will remain in the gene pool
   c. dominant genes will hide it
   d. the mutants should be considered a different species

B
3
P .88

Cor.I.19
Cor.X.30

6. If you sampled 50,000 persons for a particular trait and found that only 10,000 had it, what would be the probability that any one person would have the trait?

a. 50 per cent
b. 80 per cent
c. 40 per cent
*d. 20 per cent

B
9
P .31

Cor.I.05
Cor.X.09

7. A wagon train moving west many years ago found a place to settle with which everyone was satisfied. Suppose we assume the blood group allels were distributed in the frequencies 25 per cent IA, 10 per cent IB, and 65 per cent i. The blood groups of the descendents of this small group was later tested and the frequencies were found to be 15 per cent IA, 15 per cent IB, and 70 per cent i. This may be an example of the process of

a. mutation
b. recombination
c. selection
*d. random genetic drift

B
9
P .54

Cor.I.21
Cor.X.32

8. If there is 1/10 of a chance that we will win the football championship and 1/2 of a chance to win the basketball championship, what is the chance that we will win them both?

a. 1/2
b. 1/10
c. 2/12
d. 1/12
*e. 1/20

B
9
P .45

Cor.I-.03
Cor.X-.04

9. The chance of drawing 2 aces in a bridge hand (13 cards) is (There are 4 players, 52 cards, 4 aces)

a. 1/4
b. 1/8
*c. 1/16
d. 1/52

B
3
P .67

Cor.I.25
Cor.X.23

10. A red-green color blind man of blood type A marries a woman of blood AB with two genes for normal color vision. They have four children, 2 boys and 2 girls. The children cannot have blood type

a. A
*b. O
c. AB
d. B

B
3
P .04

11. In the preceding example, the gene for color blindness should have been inherited by

Cor.I.20
Cor.X.07

a. all the children
b. none of the children
c. only the sons
*d. only the daughters
e. one son and one daughter

B
6
P .47

12. Type 0 blood does not have any antigens or protein factor on its cells. We can assume that type 0 blood can be

Cor.I.08
Cor.X.17

*a. given to everyone
b. given to type A only
c. can receive from anyone
d. given to type AB only

B
9
P .86

13. The type of blood an offspring would not acquire from parents of type A0, and type AB is

Cor.I.15
Cor.X.09

a. type AB
*b. type 00
c. type B0
d. type A0

B
8
P .38

14. Which of the following is not an assumption made for a population model?

Cor.I.21
Cor.X.26

a. all members of a population mate and produce offspring
*b. all parents are of the same genotypes
c. all matings produce the same number of offspring, which reach maturity
d. mating is at random

B
3
P .75

15. A certain plant contains an allele which gives the plant a survival advantage. Over a long period of time this allele is increased due probably to

Cor.I.37
Cor.X.36

a. genetic isolation
b. mutation
*c. natural selection
d. artificial selection

B
3
P .54

16. A certain grower wants to develop a "seedless" watermelon. His best approach would be to

Cor.I.17
Cor.X.21

a. keep one year's seedless melons to plant for next year's crop
b. select seeds from seeded melons which have the fewest seeds and then cross pollinate
c. let "natural selection" do the job for him
*d. select melon that, when combined, produce a seedless F1 generation
e. allow self pollination as well as cross pollination on every plant to insure a continued supply of parent plants for the seedless generation

B
6
P .56

17. A pancreas cell is specialized for the production of enzymes and a striated muscle cell is specialized to contract. The difference in structure and function is due to

Cor.I.28
Cor.X.18

a. a change in the nucleus of the cell
*b. selective expression of the nucleus of the cell
c. a diminance of the cytoplasm
d. activity of the ribosomes

B
3
P .68

18. A flower grower discovered a mutant plant and decided to try to cross-breed it to obtain a new variety. This is an example of

Cor.I.41
Cor.X.29

a. a chance mutation and natural selection
b. an induced mutation and natural selection
c. an induced mutation and artificial selection
*d. a chance mutation and artificial selection

B
3
P .16

19. Assume that feeblemindedness is the result of the homozygous state of a single recessive gene. Also assume that feeblemindedness occurs in about one half of one percent of the population. What is the approximate frequency of the gene involved?

Cor.I-.11
Cor.X.17

*a. .07
b. .007
c. .10
d. .50

B
1
P .65
M 30.36

20. Resistance to TB is probably a hereditary factor as well as environmental. The union of TB resistant parents would operate for natural selection by

Cor.I.38
Cor.X.14

*a. reducing the number of TB prone individuals
b. reducing the number of TB resistant individuals
c. reducing the exposure to TB
d. no apparent affect

CHAPTER XXXIV

A
6
P .36
Cor.I.14
Cor.X-.12

1. The structure of an organism can tell us a lot about its

a. habits
b. nature
*c. function
d. all of these
e. none of these

A
8
P .38
Cor.I.24
Cor.X.28

2. Darwin was able to find convincing evidence for his theory of evolution through his study of

a. genetics
*b. geology
c. psychology
d. chemistry
e. astronomy

A
8
P .57
Cor.I.39
Cor.X.20

3. Darwin based much of his theory of racial development on

*a. struggle for existence
b. mutations
c. theory of need
d. theory of use and disuse
e. vestigal structures

A
1
P .65
Cor.I.48
Cor.X.27

4. Which of the following would be most correct? The giraffe developed a long neck because

a. it needed one and that the progress of each generation in developing such a neck was passed on to the offspring
*b. some giraffes had longer necks than others and those with long necks had a better chance to survive than those wit h shorter necks
c. a giraffe was born with a sudden change in neck structure not present in either parent
d. the environment peculiar to giraffes evenuated in its long neck, a species characteristic of the descendents

A
1
P .61
Cor.I.21
Cor.X.08

5. Which of the following type organisms seems to have the greatest possibility of survival as the environment changes?

a. the organism that is highly developed and specialized
*b. the organism that is adaptable and usually small in size
c. the organism that is dependent upon one other species for its food
d. two of the above
e. none of the above

CHAPTER XXXIV

A
1
P .89
Cor.I.41
Cor.X.28

6. The following according to your text is the main factor in evolution

   a. vestigial organs
   b. protective coloration
   c. polyploidy
   . natural selection

A
1
P .74
Cor.I.43
Cor.X.48

7. In man the appendix and ear muscles are examples of

   *a. vestigial organs
   b. homology
   c. natural selection
   d. mutations

A
1
P .63
Cor.I.35
Cor.X.25

8. Whether a variation is favorable or unfavorable to survival

   *a. depends on the nature of the environment in which the individual exhibiting the variation exists, as well as upon the nature of the variation
   b. depends primarily on the nature of the variation
   c. depends on the environment in which the individual lives

A
1
P .47
Cor.I.06
Cor.X.00

9. Evolution implies

   a. natural selection and the survival of the fittest
   *b. genetic change in organisms through the years
   c. use and disuse of characteristics
   d. inheritance of acquired characteristics

A
1
P .28
Cor.I.46
Cor.X.40

10. The Lamarkian theory would imply that

   a. mutations are the cause of evolution
   b. giraffes browse on treetops because their ancestors had long necks
   *c. giraffes have long necks because their ancestors browsed in treetops
   d. trees make better food for giraffes than grass

A
1
P .65
Cor.I.14
Cor.X.00

11. The fossil record of the ancestry of the horse provides fairly direct evidence

   a. that horses could run faster in the past
   *b. of the fact that evolution has occured
   c. of the mechanism (natural selection) by which evolution has occured
   d. that horses were hunted by predators

A
8
P .51

Cor.I.36
Cor.X.19

12. The Darwinian theory of evolution is generally preferred to the Lamarckian theory because

a. Lamarch felt mutations shaped change
*b. it more successfully accounts for the origin of heritable variations
c. the inheritance of acquired characteristics has never been conclusively demonstrated
d. Darwin had a better educational background in biology than Lamarck

A
1
P .58

Cor.I.13
Cor.X-.03

13. Evolution means to us

a. survival of the fittest
*b. living things change
c. man evolved from the apes
d. living things hope to change
e. living things are adaptable

A
1
P .89

Cor.I.32
Cor.X.12

14. The book, "Origin of Species" is based on principles of

a. atomic radiation
b. planned parenthood
*c. natural selection
d. Lamarck

A
1
P .80

Cor.I.19
Cor.X.14

15. Lizards, grasshoppers, and beetles tend to

*a. take on color of surrounding
b. keep the one basic color of the species
c. change color without regard to background
d. camouflage their backs only

A
8
P .71

Cor.I.36
Cor.X.25

16. Charles Darwin is probably best remembered for his work entitled

a. Evolution
b. Selection and Survival
*c. The Origin of Species
d. Darwin's Diary
e. none of these

A
1
P .82

Cor,I.29
Cor.X.08

17. Evolution could be said to be

a. a process which seems to occur rapidly
b. a process whereby drastic changes occur, often developing completely new structures
*c. a conservative process which depends upon the remodeling of existing structures
d. a process whereby organs become vestigal because the animal does not use the organ

CHAPTER XXXIV

A
8
P .50
Cor.I.29
Cor.X.08

18. Geological time is most accurately measured by the

a. rate or salt accumulation in the ocean
b. size of fossils
*c. rate of radioactive decay of uranium
d. thickness of sedimentary layers

A
1
P .78
Cor.I.37
Cor.X.03

19. Natural selection, as described in Darwin's scheme of evolution, assumed

a. a stable nonchanging population of animals
*b. a survival value of random differences in offspring that make for better adaptation to their environment
c. changes from generations to generations
d. environmental stimuli resulting in changes in body structure

A
1
P .75
Cor.I.46
Cor.X.30

20. A vestigial structure in man is the

*a. appendix
b. tooth
c. toe
d. fingernail

A
1
P .49
Cor.I.04
Cor.X.11

21. Lamark thought the important factor in evolution was

a. mutation
b. hormones
*c. inheritance of acquired characteristics
d. chromosomes

A
1
P .84
Cor.I.27
Cor.X.31

22. Darwin's explanation of evolution is called

*a. natural selection
b. use and disease
c. mutation
d. continuity of germplasm

A
1
P .42
Cor.I.12
Cor.X.14

23. The adaptive characteristics of an organism's response to its environment was the hypothesis of

a. Darwin
b. Lyell
*c. Lamark
d. Leeuwenhoek
e. Spallanzani

A
3
P .46
Cor.I.11
Cor.X.02

24. The known rate of decay of carbon 14 is used to date fossil material. The major limitation of this technique is

a. only organic compounds contain carbon
*b. this method is not accurate in materials older than 50,000 years old
c. the amount of half life varies from compound to compound
d. carbon is not always available

A
8
P .74

Cor.I.18
Cor.X.10

25. Five stages in the evolution of horses are shown in the text. Which of the following is not an evolutionary change?

*a. the first stage horse was larger than the modern stage
b. the loss of side toes
c. modern horse has a larger gap between the front tooth and back teeth
d. the first horse can be traced back to a four-toed animal

A
8
P .18

Cor.I.14
Cor.X.11

26. Why is the idea of embryonic resemblances viewed with caution today?

a. our knowledge is greater about DNA and RNA
b. we know that egg sizes are not the same size
c. cell division takes place at different rates in different embryos
*d. man does not pass through the lower animal stages in his early devlopement
e. not all the zygotes form a blastula stage

A
8
P .60

Cor.I-.07
Cor.X.00

27. On the Galapagos Island, Charles Darwin noted characteristics of the Finches there that greatly influenced him in his later writing. The Finches displayed

a. little variation even though the environment had greatly altered
*b. great adaptations to many environmental niches
c. convergent adaptations that suited them to a single mode of life
d. difficulty in adapting to a changing environment

A
3
P .92

Cor.I.25
Cor.X.06

28. Modern breeds of farm animals are the result of

a. preserving only dominant traits
b. natural selection
*c. selective breeding
d. influence of the environment on genes

A
3
P .78

Cor.I.34
Cor.X.44

29. Some characteristics of living things are due largely to the effects of environment and are not passed on to the offspring. Such characteristics are said to be

a. mutations
*b. variations
c. hybrids
d. recessive

A
8
P .54

Cor.I.36
Cor.X.27

30. Weismann's most important contribution was his presentation of evidence to disprove the theory of evolution advanced by

a. Darwin
b. DeVries
*c. Lamarck
d. Muller

CHAPTER XXXIV

B
6
P .90

1. The discovered skull of a once existant animal form contains very pointed and sharp teeth. This would seem to indicate that the animal was most likely

Cor.I.32
Cor.X.12

a. a vegetarian
*b. carnivorous
c. ferocious
d. parasitic

B
1
P .50

2. If a species lived in an area where there were a large number of predators for centuries, and if this species had no means of defense other than running you would expect

Cor.I.27
Cor.X.22

a. this species to develop stronger legs because of excessive use
b. this species to develop longer legs because of much use
*c. natural selection will occur and the slower organisms will be caught and killed
d. you could not expect any of the above

B
1
P .48

3. Man has four "tail" bones that terminate the vertebral column. They are considered vestigial, and they may indicate

Cor.I.19
Cor.X.18

a. ontogeny recapitulates phylogeny
*b. a close relationship to tailed primates
c. a reduction of arboreal (tree living) environments
d. muscular atrophy (a wasting away) of unused parts

B
1
P .45

4. A population of bacteria gradually displayed an inability to digest lactose though they had previously been able to digest both lactose and sucrose. This change could not be brought about by

Cor.I.24
Cor.X.21

a. a mutation in an existing chromosome
b. a recombination of parts of chromosomes
c. a deletion of a chromosome segment
*d. an addition of a new chromosome

B
3
P .89

5. An orange grower found a seedless orange in a line that has always born seeds. This would be an example of

Cor.I.16
Cor.X.06

a. selective breeding
*b. mutation
c. an allele
d. hybrids

B
3
P .51

6. Which of the following is evidence that tends to disprove the Lamarckian theory of organic evolution?

Cor.I.23
Cor.X.19

a. fish that live in caves are usually blind
b. the great ant eater has no functional teeth
c. the human being possesses a vermiform appendix
*d. none of the above
e. all of the above

B
8
P .48

Cor.I.17
Cor.X.09

7. An important miscalculation in Malthus' law of population was the fact that he

a. overlooked the possibility that war would limit the rate of pupulation growth
b. antagonized society by advocating scientific birth control
c. under-estimated the rate of growth of the worlds population
d. believed that public controls should be established over food production
*e. failed to take into account the ability of man to increase the rate of food production

B
3
P .40

Cor.I.08
Cor.X-.12

8. Weismann holds that offspring receive

*a. 100 per cent of their heritage from their parents, 1/2 from each
b. 100 per cent of their heirtage from their grandparents, 1/4 from each
c. 100 per cent of their heritage from their great grandparents, 1/8 from each
d. all three alternatives are true

B
8
P .47

Cor.I.14
Cor.X.22

9. If a zebra developed running muscles for outrunning the predatory lion which enabled his survival and that of his offspring, this would support the theory of

a. Darwin
*b. Lamarck
c. Lyell
d. Wallace

CHAPTER XXXV

A
1
P .45
Cor.I.13
Cor.X.06

1. The wings of an insect are homologous to

   a. wings of bats
   b. flippers of whales
   c. wings of birds
   *d. none of these

A
8
P .29
Cor.I.10
Cor.X.00

2. A variety when compared to a species is considered

   a. related
   b. closely similar
   c. slightly different
   d. of similar origin
   *e. all of these

A
1
P .33
Cor.I.12
Cor.X.07

3. Natural selection and insect resistance reveal

   a. acquired characteristic
   b. August Weismann theory
   *c. survival and mutation
   d. Darwin's theory
   e. none of these

A
3
P .63
Cor.I.28
Cor.X.29

4. The adaptation of an animal to its environment involves the development of appropriate

   *a. structural, behaviorial and physiological characteristics
   b. structural characteristics and overall size
   c. physiological characteristics and functioning of organism
   d. behavioral and instinctive pattern changes

A
8
P .60
Cor.I.34
Cor.X.37

5. The mutation rates for different genes vary greatly. For example, one gene may mutate as often as once in 2,000 germ cells -- other genes may pass through millions of cell divisions without mutating. However, taken as an average for any particular gene, the mutation rate per gene is closest to

   a. 1/1000
   b. 1/100,000,000
   c. 1/100
   *d. 1/100,000

A
1
P .62
Cor.I.24
Cor.X.15

6. Knowing that environments vary over long periods of time, what must happen within populations of organisms if such populations are to survive?

   a. new species must be created
   b. the reproductive rate must increase
   c. genera of such populations must cross breed with genera of another population
   *d. suitable mutations must occur and be perpetuated

A
1
P .33

Cor.I.19
Cor.X.14

7. Changes in climate and topography are thought to have effect upon the evolution or organisms when

- a. the climate changes causes genes to mutate
- b. the organisms adapt themselves to the changes and these adaptions are inherited
- *c. mutations result in organisms better adapted to these changes
- d. they cause death of all existing organisms and spontaneous generations of new ones

A
1
P .42

Cor.I.12
Cor.X-.07

8. In order to develop his theory of Natural Selection as the agent of evolution, Darwin must have postulated that

- *a. all the individuals in each generation best fitted to their environment live longer and have more offspring than the others
- b. the deaths of individual organisms occur at random with respect to the environment
- c. some of the deaths of individual organisms are dependent upon the degree to which they are fitted to the environment
- d. most of the deaths of the individual organisms occur due to hereditary deficiencies soon after fertilizaion

A
1
P .81

Cor.I.34
Cor.X.20

9. Evolution can take place more rapidly among organisms which reproduce sexually than among organisms which reproduce asexually because

- a. sexual reproduction is more hazardous than asexual, hence, only the fit survive
- b. asexual reproduction is possible only for one celled organisms
- *c. sexual reproduction is more likely to produce a variety of offspring
- d. sexual reproduction is inferior to asexual reproduction in the rapidity of production of offspring
- e. mitosis can take place only in organisms that possess sexual reproduction

A
8
P .32

Cor.I.30
Cor.X.13

10. Most mutations are recessive and this

- *a. permits the gene to survive in the population for a long time
- b. does not permit the gene to survive
- c. is lethal to the gene
- d. has no effect on the gene
- e. none of these

A
1
P .58

Cor.I.45
Cor.X.38

11. The giraffe has developed a long neck over a long period of evolutionary time. Assuming a shortage of food at the ground level, which of the following is the best reason for this development?

a. the giraffe has developed a long neck over a long period of time that allowed him to stretch higher up for food
b. the giraffes that stretched their necks to get food passed this on to their offspring
c. the shortage of food and the desire to reach higher into the trees for food caused a chemical change in the giraffe which produced a mutation for longer necks
*d. animals having mutations for longer necks were selected to live

CHAPTER XXXV

B
3
P .16

Cor.I-.13
Cor.X-.01

1. A corn plant is artifically self-pollinated

   a. offspring will be larger
   b. gene content will not vary
   *c. corn seedlings will differ
   d. there will be tall and short corn plants
   e. none of these

B
3
P .10

Cor.I.02
Cor.X.00

2. In crossing a tangerine with a grapefruit, a tangelo fruit is obtained. Seed is planted from this fruit

   a. it will not germinate
   b. all seedlings will eventually bear typical tangelo fruit
   *c. parent identity will diminish
   d. a new type of fruit will evolve
   e. none of these

B
1
P .52

Cor.I.20
Cor.X.18

3. In the offspring resulting from the cross of two pure recessive plants, having white flower, one of the progeny produced had pale yellow flowers. This may have been due to which, if any of the following?

   a. natural selection 2nd revolution
   *b. mutation
   c. environmental conditions
   d. polyploidy

B
1
P .93

Cor.I.33
Cor.X.20

4. In the Nevada desert there is a small pool about 30 feet below the surrounding desert. Here is found a type of fish known as the pupfish which has the smallest range of any known vertebrate. It has existed in this pool since the Ice Age ended.

   The limited range of this species is probably due to

   a. hybridization
   b. natural selection
   *c. geographical isolation
   d. mutation

CHAPTER XXXV

C
1 1. Change in the anatomy or physiology of this species is

P .51 a. impossible because if it were going to change it would have changed by now
Cor.I.43 b. possible only if the animal were changed to another habitat
Cor.X.13 c. possible only if the animal were crossed with another species
*d. possible by mutation
e. impossible because genes do not change

CHAPTER XXXVI

A
1
P .50

1. After the rise and descent of the reptiles the mammals came into their own. In some extraodinary cases some of the mammals looked much like the reptiles whose places they took. The porpoise is an example of this process called

Cor.I.33
Cor.X.32

*a. convergent evolution
b. divergent evolution
c. heterotrophic evolution
d. emergent evolution

A
8
P .12

2. Synthesis of amino acids, sugars, and other organic compounds which were probably purines and pyrimidines by utilization of gamma radiation as accomplished by

Cor.I.42
Cor.X.23

a. Harold Urey
b. Henry Miller
c. Sidney Fox
*d. Melvin Calvin

A
1
P .20

3. In comparing the fossil record of the history of plants with the fossil record of the history of animals it can be said that

Cor.I.05
Cor.X.11

*a. plants have left the more complete record
b. animals have left the more complete record
c. there are more "missing links" in the animal chain
d. the plant and animal records can be interpreted with equal ease
e. the animal record has the earlier beginning

A
8
P .70

4. Which of the following can be found living today?

Cor.I.38
Cor.X.30

a. saber-toothed cat
*b. cycad
c. trilobites
d. allosaurus

A
8
P .41

5. Put the following eras into correct sequence:

1. Paleozoic
2. Mesozoic
3. Pre-cambrian
4. Cenozoic

Cor.I.22
Cor.X.25

a. 3 - 2 - 4 - 1
b. 1 - 2 - 4 - 3
*c. 4 - 2 - 1 - 3
d. 2 - 3 - 1 - 4

A
1
P .68

6. Which of the following characteristics best adapts in animal such as a reptile for a life on land (independent of water)?

Cor.I.33
Cor.X.38

a. clawed toes on foot
b. a dry, scaly skin
c. internal fertilization and a shelled egg
d. no metamorphosis, young can live on land
*e. all of the above

CHAPTER XXXVI

B
8
P .46

1. Which of the following does not lend substantial support to the idea that life probably originated in the waters of the earth?

Cor.I.15
Cor.X.02

a. water is an excellent solvent
b. water is almost an ideal medium for chemical reactions
c. water offers a relatively stable environment
*d. little or no organic substance for energy release is brought to land dwelling angiosperms by water

B
1
P .69

2. Knowing that environments vary over long periods of time, what must happen within populations of organisms if such populations are to survive?

Cor.I.20
Cor.X.06

a. new species must be created
b. the reproductive rate must increase
c. genera of such populations must cross breed with genera of another population
d. the biotic potential must increase many times
*e. suitable mutations must occur and be perpetuated

B
8
P .71

3. If fossils found in Kansas are found to be similar to those found in Alaska, and the fossils are dated to plus or minus 400 years of the same age, you could say

Cor.I.37
Cor.X.28

a. these areas once had similiar climatic conditions
b. these areas once had similiar fauna and flora
c. only a is correct
d. neither a nor b could be possibilities
*e. both a and b are possibilities

B
1
P .73

4. If an organism could be proven to have had a mutation rate of zero--you might expect this organism

Cor.I.23
Cor.X.10

a. to have the ability to adapt to slow environmental changes
b. to have a low probability of becoming extinct
*c. must be living in an environment which is and has been very constnat
d. none of the above could be considered

B
1
P .67

5. What would be some probable changes in thinking on the theory of evolution if man found a chordate skeleton in the Cambrian period

Cor.I.33
Cor.X.20

a. an error was made in the identification of the chordate
b. other fossil remains need to be discovered
c. the process of evolution may have followed a different sequence
*d. all the above could be correct

B
1
P .18

Cor.I.14
Cor.X.24

6. The fact that certain plants produce edible fruits has evolutionary significance for the plants because

a. the food stored in the fruit is used by seeds for growth
b. these fruits enable many animals to survive
*c. the seeds are dispersed in the animal feces
d. most plants store food in fruits for their own future use
e. none of the above

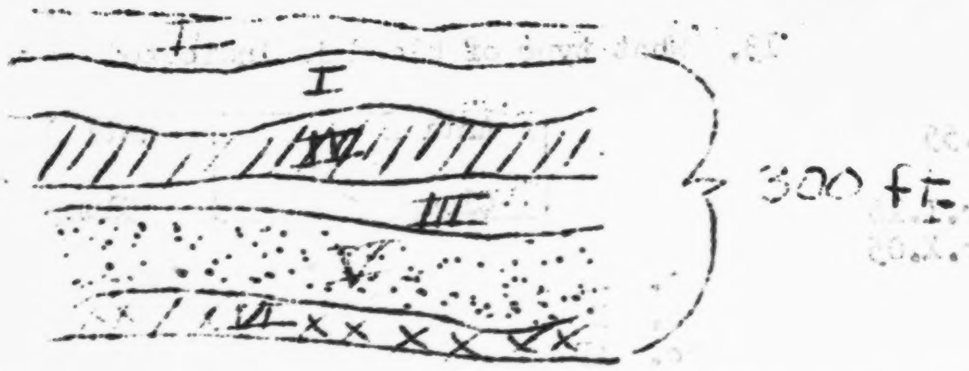
B
1
P .88

Cor.I.18
Cor.X.00

7. New fossil species will not be found in the future. This statement is

a. probably true because nearly all parts of the earth have been reached by archaeologists
*b. probably false because many forms undoubtedly lie in rock layers beneath the ocean and may be available in the future
c. probably true because all changes in the earth's surface have now taken place and therefore no new forms will develop
d. probably ture because though some parts of the earth's surface are unexplored, development there would be along the same lines as in other places which have been investigated

The following is an exposure of 300 feet of strata in the Grand Canyon. From the diagram answer the following questions....



B
1
P .92

Cor.I.02
Cor.X-.05

8. With respect to relative ages of the layers it is most reasonable to believe that

a. layer III is older than layer VI
b. layer IV is older than layer VI
*c. layer V is older than layer IV
d. layer II is older than layer IV

B
1
P .92

Cor.I.02
Cor.X.10

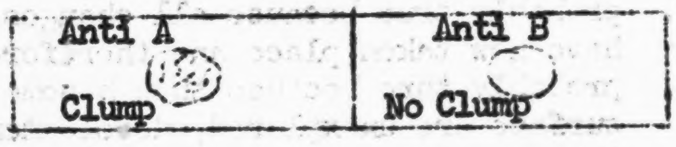
9. Bivalve mollusks and shark teeth are found in layer IV. This is a good indication that

a. layer IV was on the shore of a large lake
*b. layer IV was once covered with a body of salt water
c. volcanic activity was going on at this time, at this place
d. a food chain between mollusks and sharks was being established

B 10. There were no fossils in layer III. You might assume that
1
P .56 a. no life was on earth at this time
b. the area was covered with water
Cor.I.09 *c. there was much volcanic activity in this area
Cor.X.02 d. earthquakes were prevalent in this area

B 11. We assume life developed from simple to complex. Based on this, earliest life should have included only
1
P .92
*a. protozoa
Cor.I.19 b. sequoias
Cor.X.26 c. reptiles
d. birds

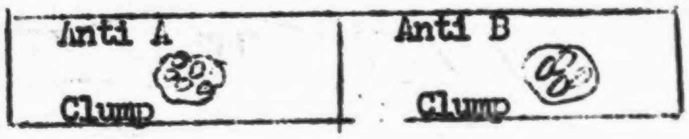
B 12. What type of blood is indicated on the diagram that follows?
6
P .38



Cor.I.34
Cor.X.25

*a. A
b. B
c. AB
d. O

13. What type of blood is indicated on the diagram that follows?
B
6
P .55



Cor.I.16
Cor.X.05

a. A
b. B
*c. AB
d. O

CHAPTER XXXVII

A
8
P .32
Cor.I.41
Cor.X.18

1. The age of rocks can be found by studying the amount of uranium they contain, that has turned to

a. carbon
*b. lead
c. radium
d. stone

A
8
P .37
Cor.I.32
Cor.X.18

2. Dubois did his work in

*a. Java
b. Peking
c. Africa
d. Tanganyika
e. Hamburg

A
8
P .18
Cor.I.03
Cor.X.01

3. Man had his origin during the __________ epoch

a. Pleistocene
b. Pliocene
*c. Miocene
d. Oligocene
e. Eocene

A
8
P .45
Cor.I.21
Cor.X.29

4. Evidence of the early Java Man was discovered in

a. Europe
b. North America
*c. Indonesia
d. Africa

A
8
P .76
Cor.I.04
Cor.X.02

5. Evidence of early man's intelligence and culture is indicated by

a. his family life
b. food he ate
c. shelter and clothing
d. his use of fire
*e. his tools and weapons

A
8
P .58
Cor.I.19
Cor.X.17

6. Which of the following statements concerning the origin of man is generally accepted by scientists?

a. there is a force responsible for the creation of life which is clearly understood by science
b. human life was created in a supernatural and mysterious manner
c. there is a chain of development in organic life, with man descending from the anthropoid apes
d. the Biblical conception of creation is entirely lacking in scientific truth
*e. man has developed by stages through the processes of mutation and adaptation

CHAPTER XXXVII

A
8
P .87

Cor.I.14
Cor.X.09

7. What general idea did Charles Darwin present, in his book The Descent of Man, about man's near relatives?

a. man descended from monkeys
b. man descended from the apes
c. Pithecanthropus erectus gave some evidence to the "missing link"
*d. that both man and apes evolved separately from some common ancient ancestor

A
8
P .79

Cor.I.14
Cor.X.25

8. The names given to prehistoric man generally refers to

a. size of brain cavity
b. skull size
c. shape of forehead
*d. location of finding
e. name of discoverer

A
8
P .88

Cor.I.17
Cor.X.14

9. Tools and implements of prehistoric man are known as

a. fossils
b. midden heaps
*c. artifacts
d. mounds

A
8
P .58

Cor.I.40
Cor.X.24

10. The manlike form which had the greatest number of ape features was

a. Peking man
b. [illegible]mosapiens
*c. Australopithecus
d. Heidelberg man
e. Cro-magnon man

A
8
P .33

Cor.I.22
Cor.X.31

11. Man-like or with characteristics of man

*a. Anthropomorphic
b. heterozygous
c. hermaphroditic
d. ancient Australopes
e. Cro-Magnon

A
8
P .37

Cor.I.25
Cor.X.15

12. The first animals to which the name man was assigned

*a. pithecanthropines
b. zinjanthropus
c. Australopithecus
d. Cro-Magnon
e. Neanderthal

A 13. On the basis of fossil evidence, the most primitive is
8
P .42 a. Cro-Magnon
*b. Proconsul
Cor.I.27 c. Pithecanthropus
Cor.X.45 d. Java man

A 14. Authorities agree that Australopithecines should be in the family
8
P .27
a. Hominidae
Cor.I-.07 b. Pongidae
Cor.X.04 *c. no agreement
d. Zinjanthropus

A 15. You have found fossils you believe to be of an early man. The best method of dating these would be
8
P .47
a. carbon 14
Cor.I.26 *b. potassium-argon
Cor.X.03 c. uranium-lead
d. isotopes of chlorine

A 16. The last million years is known as
8
P .36 a. Eocene
b. Paleocene
Cor.I.24 *c. Pleistocene
Cor.X.07 d. none of above

A 17. Except for features of the lower jaw and teeth, the skulls of __________ resemble that of modern ape
8
P .35
a. Java man
Cor.I.08 *b. Australopithecine
Cor.X.22 c. Neanderthal man
d. monkey man

CHAPTER XXXVII

B
1
P .21

Cor.I-.15
Cor.X-.27

1. The Leakeys now claim that *Zinjanthropus* may have no evolutionary relationship directly with *Homo sapiens*. Their most probable reasons for this are

a. after consulting the literature they changed their minds
b. more fossils found in area do not support their hypothesis
*c. the tools excavated are not thought to have been used by Zinjanthropus
d. it has been established that no ancestors of man were as old as Zinjanthropus

B
1
P .75

Cor.I.24
Cor.X.10

2. In terms of skull contour of the "Southern Ape Man", he shouldn't have had the ability to

a. remember
b. see
c. hear
*d. reason

B
8
P .50

Cor.I.16
Cor.X.18

3. A paleontologist studying a fossil deposit in the desert discovered a large cache of artifacts. He most likely found

a. rocks
b. mineral deposits
*c. evidence of human activity
d. fossils of pre-historic animals

B
8
P .52

Cor.I.36
Cor.X.16

4. You have discovered a pre-historic cave where there are bones which appear to be those of an early man and some kind of animals. Upon close examination you are able to identify the animals bones as those of a wooly mammoth. You therefore assume, until further examination, that the man was

*a. Cro-Magnon
b. homo-sapien
c. Java man
d. proconsul

B
8
P .93

Cor.I.19
Cor.X.17

5. In this pre-hitoric cave you also find many cave paintings. These depict horses, bison, and other animals which are unfamiliar. You could assume that the people who did the paintings were

*a. hunters
b. fishermen
c. nomads
d. farmers

B
8
P .80

Cor.I.08
Cor.X-.01

6. The painting mentioned in the preceding problem are located in the rear of the cave where there is little light. You might assume that

a. the artist (or artists) was shy and did not want his paintings seen
*b. the paintings might represent a type of magic
c. the artist was saving his work for posterity
d. the artist was wasting time

B
3
P .68

Cor.I.28
Cor.X.30

7. Our textbook states that all South American Indians have blood type O. If a gourp of So. A. Indians were found that had type A and type O, you could assume that

a. intermarriage within families had taken place
b. many mutations had taken place
*c. genes from an alien genetic pool were introduced
d. solar ionization had taken place

B
1
P .48

Cor.I.17
Cor.X.14

8. Neandorthal and Cro-Magnon man shared which of the following?

a. stone tools
b. large skulls (cranial capacity)
c. evidence of culture
d. large animals
*e. all of these

B
1
P .57

Cor.I.03
Cor.X-.07

9. The comparative cranial capacity of modern man and Austrapithecines could lead one to suspect that

a. there is no relation as far as a common ancestor is concerned
b. Austrapithecines are probably descendent from the Gibbon
*c. here is the division of ape and early man
d. the latter was a social creature
e. the modern ape is probably as "intelligent" as the Austrapithecine

B
1
P .79

Cor.I-.01
Cor.X-.08

10. In the light of modern knowledge on evolution, we can say that the human race is

*a. changing
b. not changing
c. going backwards
d. unable to tell
e. none of these

CHAPTER XXXVII

C
2
P .80

Cor.I.06
Cor.X.04

1. In a cave a series of paintings were discovered covering the walls in the caves deepest recesses. The paintings included reproductions of men and animals. We can hypothesize from these findings the following

   a. man lived in caves
   b. man hunted animals for food
   c. early man learned to paint and draw
   *d. all of these
   e. none of the above

C
1
P .19

Cor.I.10
Cor.X-.14

2. Which of the following reasons was probably the least significant during the evolution of man?

   a. mutation
   b. natural selection
   c. isolation
   *d. geographic distribution
   e. recombination

CHAPTER XXXVII

D
2
P .51

Cor.I.12
Cor.X.06

1. Which is the primary significance of the discovery of australopithecine in relationship to the evolutionary development of man?

   a. his geographic and climatic habitat
   b. cranial opening further forward
   c. he was a contemporary neighbor of zinjanthropus
   *d. he is placed earlier than modern man and median to the great apes and modern man in their structural features
   e. the presence of his tools, wall paintings and burial rituals indicated the present emergence of modern man

D
2
P .72

Cor.I.20
Cor.X.25

2. Cro-Magnon man developed a larger brain than his predecessors and attained completely upright posture and larger body size. Therefore Cro-Magnon man represented

   a. the intermediate in evolution between apes and man
   b. the modern man as we know today
   *c. the predecessor to modern man
   d. none of the above

CHAPTER XXXVIII

A
8
P .86

Cor.I.23
Cor.X.26

1. Type of culture existing among prehistoric tribes is determined on the basis of

   a. written records
   *b. artifacts
   c. word of mouth
   d. guess work

A
4
P .81

Cor.I.05
Cor.X-.04

2. Man's success on earth depends the least on his

   a. brain
   b. hands
   c. speech
   *d. toes

CHAPTER XXXVIII

B 1. Genetic studies indicate that tameness is
3
P .67 a. a trait all animals possess
*b. under genetic control
Cor.I.02 c. necessary for survival
Cor.X-.01 d. makes an animal popular

B 2. Which of the following events probably had the most direct effect on the development of human society?
1
P .27
a. manufacture of tools
Cor.I.14 *b. domestication of plants and animals
Cor.X.19 c. use of fire
d. invention of the wheel

CHAPTER XXXIX

A
8
P .79
Cor.I.16
Cor.X.14

1. An ecosystem consists of

   a. night and day
   b. men, women, and children
   *c. energy, producers, consumers, decomposers
   d. matter, earth and sky

A
8
P .39
Cor.I.33
Cor.X.23

2. Organisms on the surface of the open sea which move only by means of waves and water currents are called

   a. aqua-flo
   b. benthos
   c. winders
   *d. plankton

A
4
P .68
Cor.I.31
Cor.X.12

3. Diatoms are to marine food webs as _____ are to the terrestrial food webs

   a. primary consumers
   b. rabbits
   *c. green plants
   d. nitrogen

A
8
P .22
Cor.I.18
Cor.X-.04

4. The north pole can be classified as

   *a. desert
   b. grassland
   c. prarie
   d. none of the above

A
8
P .85
Cor.I.08
Cor.X.06

5. The tundra could be classified as a desert because of

   a. locality
   b. size
   *c. rain fall
   d. temperature constants
   e. plants

B
4
P .14

Cor.I.03
Cor.X-.02

6. An adaption one would expect in a "successful" desert plant is a

a. large leaf area, thick permeable epidermis
b. large leaf area, large root area
*c. small leaf area, large root area
d. small leaf area, thin permeable epidermis

B
4
P .37

Cor.I.09
Cor.X.03

7. The best excretory product for the conservation of water in desert animals is

a. urea
*b. uric acid
c. ammonia
d. nitrogen gas

CHAPTER XXXIX

B
4
P .83
Cor.I.28
Cor.X.07

1. The limiting factor for a permanent abundance of life in a desert is

a. lack of soil
*b. lack of primary producers
c. lack of secondary consumers
d. lack of sufficient sunlight

B
4
P .66
Cor.I.28
Cor.X-.02

2. The tropical, southeastern Asia area apparently has been seen by man as a center of the agricultural development of early man. The best reason would be

a. rain
b. temperature
c. geologic formations
d. man (early) develops here
*e. all the above

B
4
P .14
Cor.I.28
Cor.X.03

3. Much of the equatorial area is covered by a Tropical Rain Forest due to the high moisture and warmth. In a climax forest of this area you would expect to find on the forest floor

*a. no undergrowth
b. a dense jungle
c. bamboo and young trees
d. low plants such as grass and herbs

B
4
P .14
Cor.I.11
Cor.X-.01

4. A giant sequoia tree may produce many seeds in its life-time yet few sequoia seeds manage to germinate as each seed requires bare earth and sunlight to germinate. Which of the following acts would result in a greater chance for germination of the seeds?

*a. construction of a roadway through the forest
b. a fire in forest
c. complete protection of the forest
d. planting seeds in the climax forest

B
4
P .11
Cor.I.29
Cor.X.17

5. How would a cloudy, windy day affect the photosynthetic output of plant plankton?

a. the wind would slow photosynthesis by causing waves
b. more fish eat plankton on a cloudy day
c. the rate of growth is faster because the light is not so intense
*d. the cloudy day would reduce the photosynthetic output of plant plankton

CHAPTER XXXIX

C
1
P .47

Cor.I.13
Cor.X.21

1. The amount of rainfall in New England and the Central Atlantic states has been far below average for the past four years. If this trend continues, what kind of climatic community will New York State have

*a. desert
b. tundra
c. steppe
d. grassland

D
1
P .40

1. From your knowledge of the types of environments of the world and of adaptations of various species of animals to those environments, which of these "migrations" would be most successful?

Cor.I.26
Cor.X.11

*a. caribou to Siberia
b. polar bear to Rhodesia
c. porpoise to an inland lake
d. camel to Oregon
e. lion to Guatemala

CHAPTER XXXX

A
8
P .50

1. An animal that has disappeared entirely in the United States is the

Cor.I.30
Cor.X.13

a. buffalo
b. mountain lion
*c. passenger pigeon
d. whooping crane

CHAPTER XXXX

B
4
P .60

Cor.I.22
Cor.X.04

1. Deaths from infectious and many degenerate diseases have declined markedly in the U.S. during the past 50 years while deaths from circulatory disorders and cancer have increased. This can be explained by

   a. increased use of antibiotics and chemotheraputics
   b. increased knowledge of diseases in general
   c. increased longevity of the population
   *d. a and c

B
1
P .21

Cor.I.31
Cor.X.06

2. How has medical care helped to change the nature of human genetic balance?

   a. by giving innoculations and building up immunities in people
   b. the use of antibiotics have caused some pathogens to become harder to fight (they may kill more people)
   *c. have helped people with diseases such as diabetes to live longer
   d. medical care doesn't affect genetic balance

CHAPTER XXXX

D
1
P .70

Cor.I.35
Cor.X.20

1. What significance has the advancement of chemistry had in helping to change the food web?

   a. producing pollutants in our streams and rivers
   b. destroying natural "helpers" in plant reproductive cycles
   c. upsetting the balance of natural enemies
   d. often destroying the fertility of soil
   *e. all of the above

9 16

THE END